FCS RESEARCH REPORT NO. 9

Reducing Cooperative Cotton Ginning Costs In Oklahoma:

three suggested ways

FARMER COOPERATIVE SERVICE
U. S. DEPARTMENT OF AGRICULTURE

Farmer Cooperative Service
UNITED STATES DEPARTMENT OF AGRICULTURE
Washington, D.C.
20250

Farmer Cooperative Service conducts research; advises directly with cooperative leaders and others; promotes cooperative organization and development through other Federal and State agencies; and publishes results of its research, issues News for Farmer Cooperatives, and other education material.

This work is aimed (1) to help farmers get better prices for their products and reduce operating expenses, (2) to help rural and small-town residents use cooperatives to develop rural resources, (3) to help these cooperatives expand their services and operate more efficiently, and (4) to help all Americans understand the work of these cooperatives.

FCS RESEARCH REPORT NO. 9
January 1970

CONTENTS

HIGHLIGHTS

Ginning costs of cooperative gins in Oklahoma and in nearby Texas counties could be cut $5 to $20 or more a bale. Three ways of reducing ginning costs are suggested:

1. Install better cost control procedures.
2. Consolidate gins with inadequate volumes.
3. Test the central method of ginning and apply it if found practical.

Central ginning is a new method of handling cotton in this country, but it is widely followed in most foreign cotton-producing countries. In this method, growers sell or deliver their cotton to a central gin or merchant before it is ginned; the price is based on varying degrees of grading or classification. Cooperatives, merchants, or other central gin operators acquire and store enough seed cotton during the harvesting season to keep gins operating at capacity for several months per year, rather than ginning and then storing lint in warehouses and seed at oil mills, as is now done.

Several of the 54 Oklahoma co-op gins studied will be forced to close if gin costs continue to rise and production declines further. Several have paid small cash refunds, if any, in recent years.

Salaries, wages, and depreciation are usually the major costs of cooperative gins, accounting for over half of all ginning costs. Salaries and wages appear likely to increase more, and if co-op gins are kept modern, depreciation will also increase.

Other factors influence cooperative ginning costs and some of them are related to each other. Seasonal operation of gins, a basic cause of the high costs of conventional gins, results from ginning cotton about as fast as it is harvested and only during harvesting.

Costs were generally lower on low-capacity gins than on high-capacity gins with similar volumes. Costs were substantially different ($5 to over $20) within groups of either low- or high-capacity gins with similar volumes. These relationships indicate costs could be lower in many cases.

In 1967, the 54 gins had an average weighted cost per bale for ginning of $29.18. The average total cost was $36.33 a bale for ginning and associated services. Total costs for consolidated conventional cooperative gins were estimated at $30.35 per bale. This was about $6 less per bale than for the 54 gins studied.

Estimated total costs for cooperative central gins in Oklahoma with receiving stations would be $19.15 per bale, or about $17 less per bale than the average for the 54 gins studied. Total costs for central gins without receiving stations were estimated at $14.80 per bale or about $21.50 less than for the 54 conventional gins. Cotton growers would have some higher costs for harvesting cotton under the conditions assumed for central gins without receiving stations. However, these additional costs would likely be less than the savings from omitting receiving stations. Data for this study were from southwestern Oklahoma, but the recommendations include the nearby area of Texas.

Costs reported for central gins in foreign countries indicated this method had $3 to $7 per bale lower ginning costs than conventional U.S. gins. Major cost advantages of central gins over the conventional gins are much more efficient use of labor and much lower depreciation and other fixed costs.

Cooperative gins in Oklahoma and Texas average 3 hours of labor per bale, but they lose about 2 of each 3 hours waiting for cotton to arrive. Central gins would require only about 1 hour or less labor per bale because they would gin continously from stored seed cotton. Central gins could gin about 3 to 10 or more times as many bales per year as conventional gins of the same size.

REDUCING COOPERATIVE COTTON GINNING COSTS IN OKLAHOMA

Three Suggested Ways

by John D. Campbell
Cooperative Appraisal Division
Farmer Cooperative Service

Oklahoma cotton growers originally organized and patronized cooperative gins to gain (1) better ginning of their cotton, (2) better gin services, and (3) lower ginning costs. Better ginning, as used here, refers to equipping and operating gins so that the ginned lint is the highest quality practical under the prevailing conditions and the cottonseed is well cleaned of lint and trash. Better gin services could result in less waiting time at gins to unload wagons or trailers, weighing cottonseed rather than estimating weights, and improved handling and marketing of lint and seed.

With few exceptions, Oklahoma cooperative gins have been and are now well equipped to do good to excellent jobs of ginning cotton. They have reduced waiting time at gins and nearly all of them have handled cotton and cottonseed satisfactorily. But co-op gins have varied widely in reducing ginning costs.

Many co-op gins have made substantial net savings, but some have reinvested most or all of their savings in the gins. While such savings are generally allocated to the growers on the books, as preferred stock or book credits, only a few Oklahoma co-op gins have revolved or paid the growers retained savings in recent years. As far as growers are concerned, the cost of ginning their cotton is not at cost when retained savings are not revolved. When retained savings are not returned to members, but retained for benefit of growers in later years, inequities are created between past and future members.

The costs of owning and operating co-op gins have been increasing for many years, but in recent years the increase has become more rapid and costs are now a serious problem at most cooperative gins in Oklahoma.

The charges for ginning, bagging, and ties are the direct costs of ginning to growers at noncooperative gins, but in effect such charges are an advance by growers who patronize cooperative gins. The final cost of ginning is unknown by co-op gins at the time cotton is ginned, and costs may be more or less than the charges made at that time. The gin margin on cottonseed can be considered an indirect cost of ginning at noncooperative gins and as an additional advance at cooperative gins. Any

costs gins have on cottonseed are included in ginning costs, as oil mills commonly pay for the loading and hauling of the cottonseed.

Whatever viewpoint is taken of gin margins on cottonseed and fees or margins on baled lint, the cost of ginning to growers is determined at noncooperative gins when the cotton is ginned. The cost of ginning at co-op gins is determined at the end of the season or end of fiscal or accounting year, or even in later years if retained savings are revolved and eventually paid to growers.

In 1967, most Oklahoma co-op gins had ginning costs that were higher than the charges for ginning and bagging and ties. Costs of many of them exceeded the gin charges or advances plus the gin margins on cottonseed, and costs of some exceeded all sources of revenues.

At a meeting in the summer of 1967, attended by representatives from most of the Oklahoma co-op gins, the Farmer Cooperative Service was requested to conduct a study on costs of cooperative gins, their volumes, transportations, and related problems. They wanted the study made from a grower-oriented viewpoint and directed toward increasing efficiency in use of investments in cooperative gins. This publication reports the results of that study.

PURPOSE AND METHOD

The general purpose of this study was to analyze the recent operations of 54 cooperative gins in Oklahoma and to develop recommendations and suggestions for reducing ginning costs and increasing the efficiency of growers' investments in their gins.

Specific objectives of the study were to: (1) determine ways of reducing costs and increasing efficiency of gins following the present method of operation; (2) determine the reductions in ginning costs that can reasonably be expected from consolidating gins that receive low or inadequate volumes; (3) determine the potential of new or different methods of organizing and operating cotton gins; and (4) develop recommendations for reducing total costs of ginning and the closely related phases of producing and marketing cotton cooperatively in Oklahoma.

Interviews were made at all 54 Oklahoma co-op gins operating during the 1967 season or on the 1967 crop. Managers were interviewed at 50 of the gins. Audits, member statements, and other data were obtained from these managers. Assistant managers, bookkeepers, or other employees furnished information for the four gins where managers were not available. One director was also interviewed at 47 of the gins. Of the directors interviewed, 13 were the presidents of their gin boards, 13 others were secretary of their boards, 7 were vice-presidents, and the other 14 were board members. They provided additional information on gins, hauling, and other data.

The Wichita Bank for Cooperatives of Wichita, Kan., also supplied some cost and revenue data for the 1967 crop and similar data for the 1964, 1965, and 1966 seasons.

Some data were obtained from Oklahoma State Government offices, such as rates on workmen's compensation, unemployment insurance, and hauling rates for trucking.

Other data used for this study were from the files of the Farmer Cooperative Service and secondary or published material.

COST OF OKLAHOMA COOPERATIVE GINS

Costs of owning and operating each of the co-op gins were calculated for the 1967 season. The cost to gins for bagging and ties were included, since they are part of the cost to growers for ginning. Three co-ops had two gin plants or batteries and one had three, but since three of them ginned most of their cotton in only one of their plants, they were all included with the others in the analyses.

Some gin associations also operated grain elevators, lumber yards, or other major enterprises. Breakdowns were obtained on all costs, which were allocated and adjusted to show costs for gin operations only. This made costs of all the gins comparable. The ginning costs ranged from less than $20 to over $50 per bale, and averaged $35.60 on the 1967 crop (table 1).

Table 1.--Frequency distribution of Oklahoma cooperative gins by cost groups, average costs, and volumes of groups, 1967 crop

Ginning costs per bale	No. of gins	Average costs per bale of group	Average number of bales per gin of group
Less than $20	3	$17.04	5,125
$20.00 - $24.99	5	22.52	3,676
$25.00 - $29.99	17	26.84	2,690
$30.00 - $34.99	4	32.37	1,808
$35.00 - $39.99	8	36.71	979
$40.00 - $44.99	7	42.43	1,334
$45.00 - $49.99	3	48.20	790
$50 and over	7	62.32	803
Total	54	--	111,885
Average	--	35.60	2,072

If the costs were weighted by bales ginned, as would be the case if total costs of the 54 gins were added together and that sum were divided by the total number of bales they ginned, the average weighted cost per bale would have been $29.18 per bale or $6.42 less. The weighted costs per bale represent the average ginning cost on all cotton ginned.

The costs of the individual gins were considered better for analyzing operations of the gins as they now operate and will be used in the first portion of this report. Costs weighted by bales will be used in the latter part of this report for comparing costs with other methods of organizing and operating gins.

The average costs of ginning shown in table 1 for the lowest and highest cost groups differed by about $45 per bale. The average cost of the highest cost group was over three times that of the lowest cost group. The average costs for the 54 gins were slightly over twice that of the lowest cost group. These differences indicate that there are opportunities and potential ways for reducing the present costs of ginning cotton cooperatively in Oklahoma.

The average cost of the highest cost group in table 1 was equal to about half of the combined Oklahoma farm market price or value per bale of the cotton lint and seed. The average cost for the 54 gins of $35.60 per bale was 28.2 percent of the combined farm value per bale of Oklahoma cotton and cottonseed in 1967 (fig. 1).

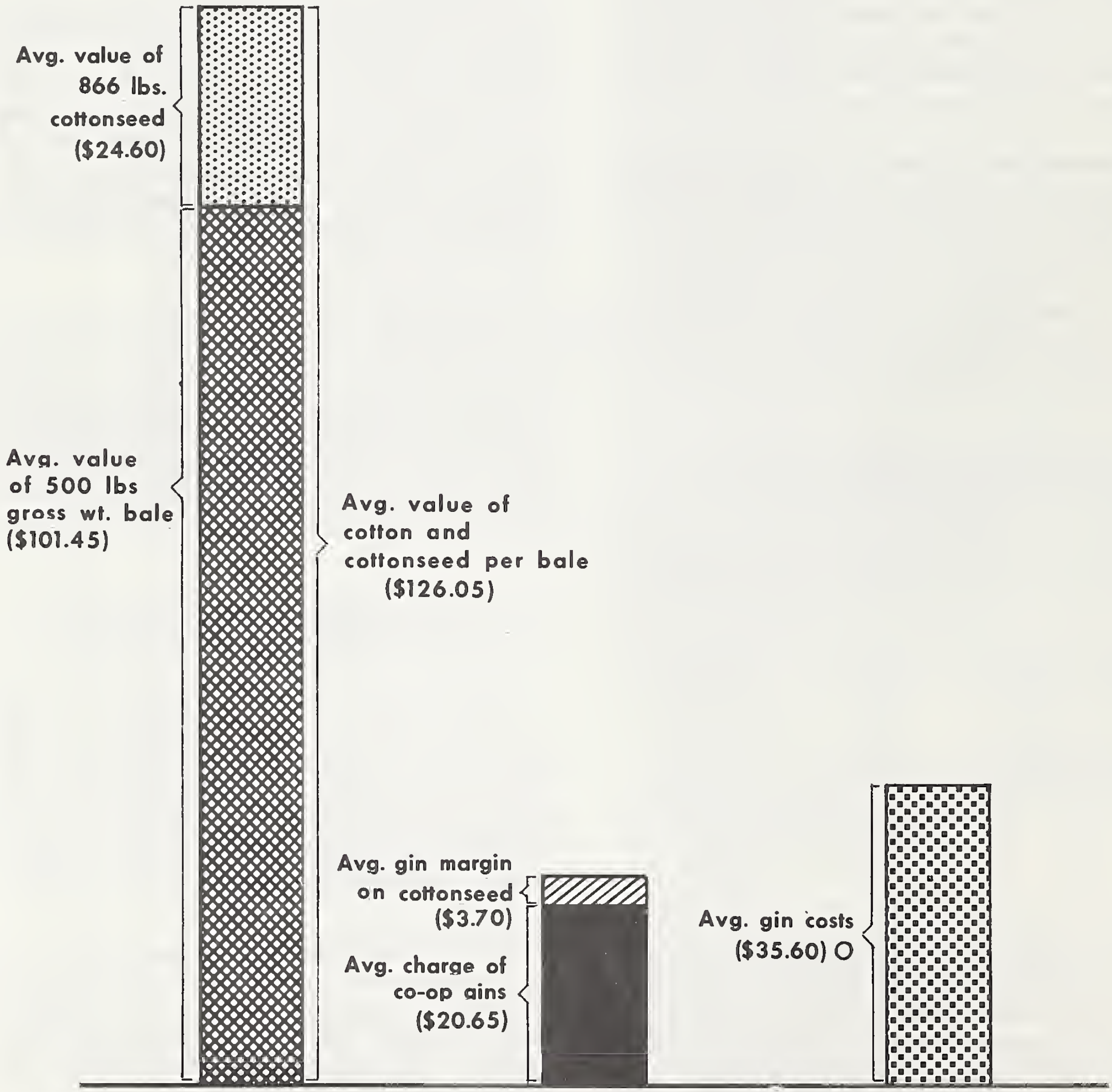
Relative Importance of Costs Common Among Gins

Costs of co-op gins were grouped into a few items common to all of them and the minor, unusual, joint items, and other costs were combined and shown as "other" in table 2. This procedure permitted analyzing the common items and determining their relative importance.

Salaries and wages--when combined--were the largest item and accounted for one-third of the total costs (table 2). Salaries and wages were separated into managers' salaries, office salaries, and wages to show their individual importance.

Workmen's compensation insurance, unemployment insurance, and the portion of social security payments made by gins were considered part of the cost of salaries and labor in this report. Rates for these items were

FIGURE 1.--AVERAGE FARM VALUE PER BALE OF COTTON AND COTTONSEED, GIN CHARGES PER BALE, AND AVERAGE GIN COST PER BALE FOR 54 COOPERATIVE GINS, IN OKLAHOMA, 1967 CROP*



*PRICES USED FOR COTTON AND SEED IN CALCULATING VALUE FROM USDA REPORTS. GINNING CHARGES AND COSTS WERE FROM THIS STUDY AND SURVEY. O AVERAGE OF GIN COSTS EQUALS 28.2% OF VALUE OF COTTON AND COTTONSEED.

Table 2.--Average gin costs for 54 cooperative gins in Oklahoma, 1967 crop

Item	Average cost per bale[1]	Percentage of total
	Dollars	Percent
Salaries and wages:[2]		
Managers' salaries	4.10	11.5
Office salaries	1.70	4.8
Labor (operation of gin)	6.03	16.9
Total salaries and operating labor	11.83	33.2
Utilities (power, fuel, water, and lights)	2.23	6.3
Gin repairs and supplies (includes repair labor)	3.91	11.0
Fire insurance (on gin and office)	0.65	1.8
Ad valorem taxes	0.81	2.3
Depreciation	8.83	24.8
Bagging and ties (cost to gins)	2.94	8.2
Other (telephone, travel, office supplies, etc.)	4.40	12.4
Average costs of 54 gins	35.60	100.0

[1] The average costs per bale of items for each of the 54 gins were calculated, then totaled and divided by 54 to find these costs.

[2] Salaries and wages included social security payments paid by gin, and workmen's compensation, and Oklahoma unemployment insurance payments. Rates used for calculating costs were 7.5 percent of salaries of managers and office workers and 14.5 percent of cost of gin operating labor.

estimated to average 7.5 percent on managers' and office salaries and 14.5 percent on gin labor. Data were not available for separating labor from repair parts and materials for many of the gins, so repair labor was included in repairs and gin supplies. This procedure shows the costs to gins for these items more accurately than when workmen's compensation and unemployment insurance are included in insurance expense and social security payments made by gins are included in taxes. These items vary directly with office salaries and wages and with managers' salaries.

Operating labor equaled about one-sixth of total ginning costs and was slightly over half of all salaries and wages (table 2). Managers' salaries were slightly over a third of all salaries and wages and over a tenth of the total ginning costs. Office salaries were about one-twentieth or nearly 5 percent of total ginning costs. Depreciation averaged about one-fourth of the total ginning cost. Depreciation together with salaries and wages totaled nearly 60 percent of the total ginning costs. Gin repairs (including parts, material, and repair labor) averaged $3.91 per bale and were only slightly less than the costs of managers' salaries. Gin repairs and supplies were over a tenth of the total ginning costs. Bagging and ties cost nearly $3 per bale and utilities averaged over $2 per bale. Ad valorem taxes and fire insurance on gins each averaged less than $1 per bale.

Other costs (telephone, travel, office supplies, etc.) averaged about an eighth of the total ginning cost. These costs, in total, equal an important amount and some of the items making up this group were much higher at some gins than at other similar gins. Telephone costs varied widely. Differences in accounting and reporting practices limited the analysis of the separate items making up the costs included in "other."

FACTORS AFFECTING GINNING COSTS

Several factors influence the costs of ginning cotton, individually and in combinations, and frequently these factors are related. Factors discussed in this section include volumes and capacities, operating labor, depreciation, management, and seasonality.

Volumes and Costs

The general relationship in ginning of lower costs on larger volumes and higher costs on lower volumes are well known in the cotton industry. The relationship of volumes and costs is similar within areas but differs substantially between areas due to various factors and different conditions and relationships such as different methods of harvesting and different size gins.

The general relationships of volumes to costs that existed in Oklahoma for the 1967 crop are indicated in table 1. There were some apparent inconsistencies. For example, the group of

seven gins with costs averaging $42.43 per bale averaged ginning about one-third more cotton than the preceding group that had an average cost of $36.71 per bale. Apparent inconsistencies were caused largely by one or more gins in the groups having unusually high or low costs for their group.

The approximate relationships of cooperative ginning costs to bales ginned in Oklahoma are indicated better by the curve in figure 2. There were about equal numbers of gins (shown by dots) above and below the line. The unusually high- or low-cost gins did not affect the cost curve as much as in averages of the groups in table 1. See page 35, in appendix for method used for fitting curves in figures 2 and 3.

According to figure 2, ginning costs increased very rapidly as volumes declined below 2,000 bales. Costs decreased at a declining rate as volumes increased over 2,000 bales. Ginning costs were lowest on the largest volume included.

There were two somewhat different groups or populations in the data used for developing figure 2. One group consisted mostly of high-capacity gins (seven bales or more per hour); the other group was mostly lower capacity gins (less than seven bales per hour).

When the data were separated on the basis of high- and low-capacity gins, figure 3 was developed. The use of capacities in this way separated most but not all of the gins which had installed high-capacity gin stands with matching cleaning and conditioning equipment from the group in which most were still using 80- or 90-saw stands with 12-inch saws.

A few low-capacity gins had replaced their four or five 80- or 90-saw stands with two high-capacity stands, but had not increased their capacity beyond seven bales per hour. For example, a gin with two 120-saw stands with 12-inch saws and a gin with five 80-saw stands with 12-inch saws would each have an estimated capactiy of 5.0 bales an hour. Both would be considered low-capacity gins in this study.

Gin capacity and the methods used to determine it in this study are discussed in more detail in the appendix and table 9 on p. 32.

According to figure 3, high-capacity gins had over $6 per bale higher costs on volumes of about 2,000 bales than lower capacity gins had on that volume. On 1,000-bale volumes, costs were about $8 per bale more for the high-capacity gins. Data from low-capacity gins were very limited in 1967 for volumes over 2,000 bales. However, ginning costs in FCS files for 1965 and 1966 included several Oklahoma low-capacity gins with volumes over 2,000 bales. These data support the location of the low-capactiy gin curve on volumes over 2,000 bales.

The costs were analyzed by items for high and lower capacity gins with volumes of 1,000 to 2,000 bales. It was found that the depreciation of the eight gins with lower capacities within that volume range averaged $6.24 per bale, while the nine high-capacity gins averaged $12.53 per bale. Both groups averaged close to 1,500 bales--less than 100 bales over or under 1,500--and the difference of $6.29 per bale in depreciation accounts for most of the difference in costs of about $6.70 indicated in figure 3 at 1,500-bale volume.

Operating Labor

As previously stated, operating labor was a major item in the costs of co-op cotton gins and amounted to about one-sixth of the total gin cost (table 2), but over half of that cost was lost in waiting for cotton to arrive.

Data on bales ginned per day were obtained for 43 of the 54 gins surveyed. Those data showed that they ginned one or more bales for 36 to 108 days and averaged that amount for 57 days. However, only five gins ginned one or more bales for 70 or more days and only two ginned one or more bales for less than 40 days. Thus 36 of the 43 gins ginned one or more bales for 40 to 70 days that season.

FIGURE 2.--COSTS AND VOLUMES RELATIONSHIPS OF OKLAHOMA COOPERATIVE GINS, 1967 CROP

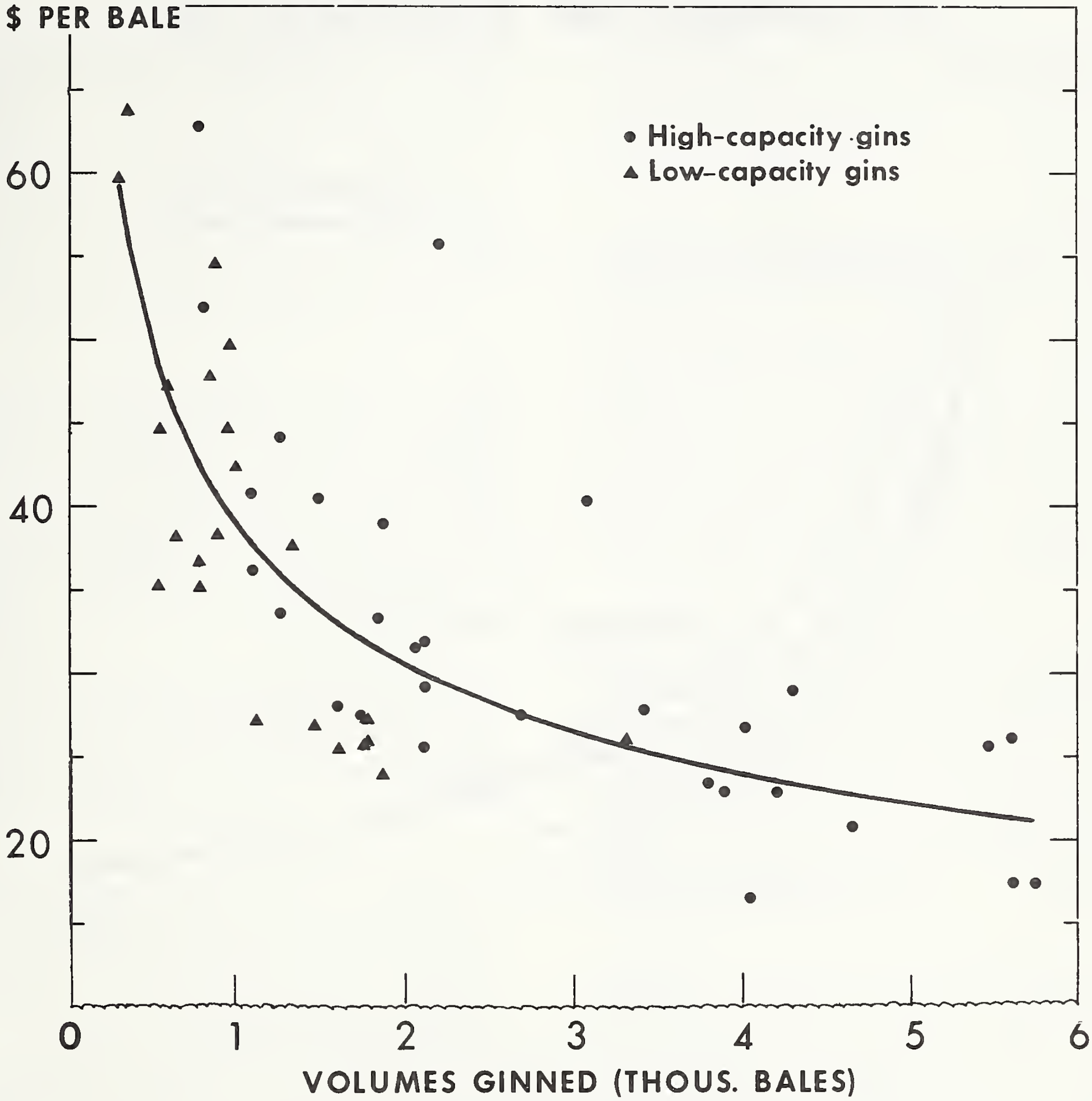
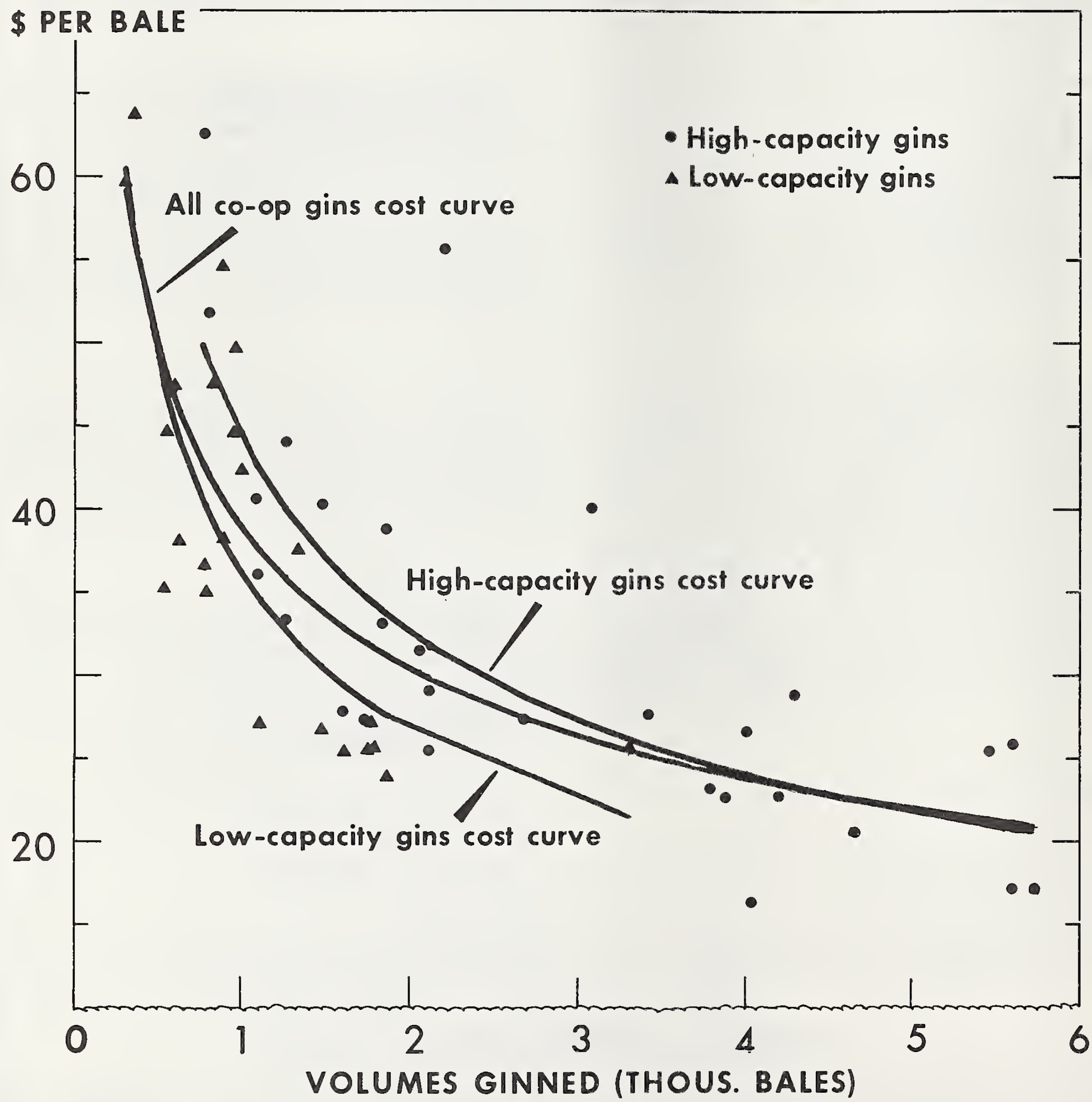


FIGURE 3--COST AND VOLUME RELATIONSHIPS OF HIGH-CAPACITY, LOW-CAPACITY, AND ALL COOPERATIVE GINS, IN OKLAHOMA, 1967



The managers reported gins were ready to operate an average of 111 days, which was almost twice the 57 days that the gins averaged ginning one or more bales. These gins processed only one or a very small number of bales some of the days they did operate. As a group, they were idle substantially more than half of the time, while part of a crew or a full crew of workers were on payrolls and the gins were ready to operate.

Most of the gins had only skeletion crews on payrolls during the early parts of their seasons. Many also had only part crews on payrolls the latter part of the season. However, over half of the total labor paid for was wasted.

Operating labor costs for the 54 co-op gins averaged $6.03 per bale, (table 2). Operating labor cost averaged about $1.75 per hour, including workmen's compensation insurance, unemployment insurance, and gins' portion of social security taxes. This average included wages of ginners. At an average rate of $1.75 per hour, $6.03 cost per bale indicates an average of over 3 man-hours were used per bale.

The data on hours of labor and labor costs per bale were separated for high- and low-capacity gins. It was found that hours of labor and cost of labor increased substantially for both high- and low-capacity gins on volumes below 1,000 bales (table 3).

Table 3.--Average man-hours of labor used per bale by low- and high-capacity gins, by ranges in volumes, cost of labor used, Oklahoma cooperative gins, 1967 crop

Range in bales ginned by capacity	Man-hours used per bale	Cost of labor used per bale	Average bales ginned by gins in group
Less than 1,000 bales:			
Low-capacity gins...	4.4	$7.80	687
High-capacity gins..	4.5	8.20	775
1,000 to 2,000 bales:			
Low-capacity gins...	2.7	4.75	1,580
High-capacity gins..	3.0	5.40	1,458
Over 2,000 bales:			
Low-capacity gins[1]..	--	--	--
High-capacity gins..	3.1	5.40	3,735

[1] There was only one low-capacity gin in this range and its data are omitted to avoid disclosure of individual operations.

On volumes of 1,000 to 2,000 bales, low-capacity gins used less labor--0.3 man-hour--per bale than high-capacity gins (table 3). Low-capacity gins averaged a little over 100 more bales in this volume range, which may have accounted for a small part of this difference. Too few low-capacity gins had volumes over 2,000 bales for a comparison. High-capacity gins averaged slightly more labor on volumes over 2,000 bales than on volumes of 1,000 to 2,000 bales (table 3).

A ratio of gin capacities in bales per hour to the number of men per shift during the peak period indicates the labor requirements of gins operating at capacity. For example, if a gin with a capacity of seven bales per hour uses seven men per shift, the ratio is 1.0 man per bale capacity. If a seven-bale-per-hour gin used eight men per shift, the ratio would be 1.1 men (when rounded to nearest tenth) per bale of gin capacity. A six-man crew on a seven-bale-an-hour gin would have a ratio of 0.86 or 0.9 man per bale of gin capacity.

Analysis of the data on the men in gin crews during the peak weeks showed that, at high-capacity gins with volumes under about 2,000 bales and at low-capacity gins with less than 1,000 bales volumes, the ratios of men used per bale of gin capacity were highly irregular. Apparently a full crew was not required on those volumes during the peak of the season and the managers' views or other factors limited or largely destroyed the ratio of labor to output at these levels.

The high-capacity gins with volumes of over 2,000 bales (which averaged nearly 4,000 bales) averaged 9.2 bales per hour in capacity and their crews averaged 8.7 men per shift. Consequently their ratios were 0.95 man per bale of gin capacity. The 10 high-capacity gins with the largest volumes, averaging 4,747 bales, also had the same ratio of 0.95 man per bale of gin capacity.

The low-capacity gins with 1,000 to 2,000 bale volumes had average capacities, of 5.3 bales per hour and their crews averaged 5.9 men per shift. So these gins' ratios would have been 1.11 men per bale of gin capacity.

The above ratios indicate that high-capacity gins could potentially gin cotton when ginning at capacity rates, with 0.16 less man-hours per bale (1.11 - 0.95 = 0.16). At an average cost of $1.75 per hour for gin labor, 0.16 hour per bale would equal 28 cents per bale.

The view is widespread that installing high-capacity gins results in reduced labor cost and lower ginning costs. The above difference of 0.16 fewer man-hours per bale and 28 cents less labor cost per bale appears to support that view. However all increases in other gin costs, such as in depreciation, resulting from installing high-capacity gin equipment must be included in a valid evaluation of total costs. If a high-capacity gin receives 4,000 bales and saves 28 cents a bale on labor cost, it would save $1,120. But at a depreciation rate of 7 percent, $1,120 would cover only the depreciation on $16,000. There would be some other additional gin costs, such as additional insurance. Larger volumes will likely be needed for any high-capacity gin and risks will likely increase.

Neither the average hours used per bale during the entire season nor labor requirements as developed above with ratios of gin capacities and men per shift indicate ginning costs can be lowered by installing high-capacity gins when additional cost for depreciation is included. Converting low- to high-capacity gins usually costs much more than $16,000. Apparently, low-capacity gin equipment must be past repairing and the average volumes available close to 4,000 bales or more before Oklahoma cooperative gins can justify installing high-capacity gins on the basis of ginning cost relationships.

The above ratios of about 1.0 man-hour per bale at capacity rates indicates that when gins use or employ an average of 3 man-hours per bale for the season, they are wasting two-thirds of the labor they pay for on the average while laborers wait for cotton to arrive.

The management of most co-op gins appeared to have employed only about the necessary amount of labor for operating the gins by the method followed. However, cost of operating labor was unduly high at 12 gins, since labor costs were two to three times as much at these gins as at other similar gins with similar volumes. Volumes of these 12 gins ranged from among the highest to among the lowest. Reducing the labor used at these gins appears to offer an excellent opportunity for reducing ginning costs. Some reduction in the labor used at some other gins appears possible, even though the labor they used cost only $1 to $2 more a bale than at gins with similar volumes.

Depreciation

Depreciation--the second largest major cost item--accounted for about 25 percent of the total ginning cost. Depreciation ranged from slightly less than $3 to more than $25 per bale among the 54 cooperative gins. Sixteen gins, or nearly one-third of them, had depreciation of over $10 a bale and the depreciation on the six with the highest amounts averaged nearly $20 a bale. Eight of the 16 gins were high-capacity. Four of the eight low-capacity gins with depreciation of over $10 per bale had installed high-capacity stands and other new machinery but did not have capacities of seven bales or more per hour.

Depreciation is only estimated, and it is less visible, but it is as much a gin operating cost as wages, salaries, and other items. Depreciation rates can be debated but not that depreciation is not a legitimate gin cost. Depreciation is familiar to most people on autos. Depreciation on gins is similar to that on autos except the rates on gins are lower and depreciation on autos may be all personal expense, all business expense, or divided between the two in some proportion.

Depreciation results in a cash flow which may be used for many purposes. It may be viewed as conversion to cash of assets that are used up by obsolescence in operating the gin. Those funds might be retained as cash or its equivalent, paid on notes given for machinery, or for replacing wornout equipment (but this

appears to be done infrequently by cotton gins). The cash for depreciation can also be considered or treated as a return of original investments.

Depreciation involves a long-term commitment and may involve considerable risk in cotton gins. A rate of 7-percent depreciation requires 14 to 15 years to recover the original cost of the item, if the gin net income covers other costs and depreciation.

As stated previously, depreciation is an estimate and consequently the rate may be too high or too low. When the rate corresponds to the useful life of the equipment, the greatest degree of equity is obtained among members of cooperatives. But the time that the equipment can be used at less total cost than any alternative, such as replacing it, should determine how long it is used. Just because an item of equipment if fully depreciated on the books does not mean it should be discarded. Sometimes some equipment or even entire plants should be discarded or sold before they are depreciated on the books. Or a gin may operate for several years with very little depreciation after most items have been depreciated out on the books.

Financial Planning

Planning and management are complex matters. A complete analysis of the management of the cooperative cotton gins in Oklahoma was not planned for this study. However, a few phases of management by the members, the directors, and gin managers that affect ginning costs are discussed briefly below.

Some groups have apparently bought more modern gin equipment than they can afford, especially if 1967 volumes and costs continue. Some gins would have big burdens in depreciation and some on note payments also, even with twice the volumes they ginned in 1967.

In recent years, Oklahoma co-op gins have been getting about $24 to $26 per bale from charges for ginning, bagging and ties, and gin margins on cottonseed. If they are going to lower the cost to growers on ginning, their costs need to be below $25 per bale.

According to figure 3, it takes about 2,500 bales for the average management at low-capacity gins to get costs down to about $25 a bale. About 3,700 bales are required for average management to get costs of high-capacity gins down to that amount.

Careful and cautious estimates of future volumes are needed before the purchase of any substantial amount of new gin equipment. It is recognized that volumes were unusually low because of the unusually small 1967 crop. However, many gins with serious cost problems in 1967 averaged less than 2,000 bales--and several averaged only about 1,000 bales--for the last hour seasons (1964-67). One gin, with over $20 per bale depreciation in 1967, averaged less than 1,000 bales the last 4 years, but had installed over $100,000 worth of new gin equipment since 1960. It is very difficult to reduce depreciation costs other than with larger volumes which may not be available in the future.

Managers' and Office Salaries

Salaries paid for managing Oklahoma cooperative gins averaged about $5,000 in 1967. Some of these salaries were for managing gins plus minor sidelines such as seed and fertilizer. Others were that part of the total salary charged to the gin department or division; the balance was charged to one or more other departments, such as grain elevators.

A good or excellent manager deserves a good salary, but a good salary, unfortunately, does not insure the gin will get a good manager. Good managers apparently keep all costs as low as they can and can save enough on gin costs to more than pay the difference between minimum salaries and medium or even higher salaries on large volumes.

If the directors pay a gin manager only $4,000 but that manager uses extra labor costing $2 more per bale on 4,000 bales than a $6,000-per-year manager, the low-salaried manager has cost the gin substantially more on labor alone than they would have paid for the better manager.

The importance of volumes to managers' salaries in ginning costs are evident from a few calculations. For example, if a gin pays a manager $5,000 per year and gins 5,000 bales, the manager's salary averages $1 per bale; if only 2,000 bales are ginned, the manager's salary averages $2.50 per bale. On 1,000 bales, a $5,000 salary averages $5 per bale.

Office salaries varied widely among the co-op gins with similar volumes. For example, four gins with 4,000-bale volumes from the 1967 crop had office salaries that averaged 58 cents, 66 cents, $1.13, and $1.79 per bale. Four other gins with volumes of 1,750 bales had office salaries that averaged 54 cents, 99 cents, $1.35, and $2.55 per bale. There are apparently opportunities for at least some gin managers to reduce office salary expense. Some gins have inadequate records for proper management of the gins, but adequacy or inadequacy of records does not appear to be related directly to the amounts paid for office salaries. Probably some gins pay too much for office salaries and some too little.

Costs Based on Rates

Several gin cost items are or appear to be fixed by the prevailing rate schedules. Among these are electric power, fire insurance, and ad valorem taxes. However, something may be done to reduce some of these items. For example, there may be justification for reductions in electric power rates, since air conditioning or other uses now cause peak loads on electric power systems instead of cotton gins. For further details on electric power rates and relationships in Oklahoma see (1) and (2).[1]

Minor changes can sometimes reduce fire insurance rates substantially. If gins are rebuilt, insurance regulations and rates are usually carefully considered. Gins located outside city limits have lower tax rates and they may not be required to haul or dispose of burs and trash as rapidly and they may dispose of them at lower costs than in town.

[1] Underscored numbers in parentheses refer to items in the Literature Cited, p. 31.

Importance of Each Item of Cost

Some gin managers apparently keep each cost as low as they can, while others allow several costs to go higher than necessary. The importance of keeping each item of cost low is shown for two high-capacity gins on approximately equal volumes of between 2,000 and 3,000 bales in table 4.

Table 4.--Comparison of selected cost items per bale for 2 high-capacity Oklahoma cooperative gins on approximately equal volumes, 1967 crop

Item	Costs	
	Gin A	Gin B
	Dollars per bale	
Office salaries	1.39	1.95
Bonuses to employees	.12	.33
Repairs and supplies (includes repair labor and material)	2.82	5.28
Office expense and supplies	.26	.43
Telephone and telegraph	.09	.38
Advertising	.28	.69
Total	4.96	9.06

Gin B's total costs for the items shown in table 4 were about $4 per bale higher than for gin A. Even if repair costs were omitted, the other items total about $1.50 more for B than for A. The total costs for gin B (not shown in table 4), were about $6 per bale more than for gin A.

Seasonality

Cotton is usually planted at about the same time within an area served by a given gin. It is commonly harvested with stripping or picking machines and about two-thirds of it is ginned in about 3 weeks. About 1 to 3 months are used to harvest and gin the rest of the crop. Such seasonality has important effects on ginning costs.

Data were obtained on bales ginned by days for 43 of the 54 gins. Usually, 21 consecutive days comprised the peak periods of most gins, but the peak periods were 1 to 5 days longer or shorter in some cases. Sundays were included in counting the 21 consecutive days if

one or more bales were ginned on a Sunday, but excluded if no bales were ginned. The percentages of the bales ginned in 21 days of the total ginned for the year, were calculated and the distribution of the gins by these percentages are shown in table 5.

The five gins which ginned less than half their volume in 21-day periods were exceptions or different from the others in that most of them had members with both irrigated and dryland cotton and both picking machines and strippers were used to harvest the cotton. These growers also apparently planted their cotton on different dates. As a result, some of these gins had two small peak periods and their seasons were longer. The gins that ginned less than half their volumes in the 21-day peaks averaged ginning one or more bales on each of 75 days while the entire group averaged ginning one or more bales for only 57 days.

The total number of bales ginned did not influence the percentages ginned in the 21-day peaks. Table 5 shows the average numbers of bales in the 5 groups. The average number of bales per gin for the group ginning less than half their volumes in 21 days appears to be an exception, but examination of the volumes of specific gins showed one of those five ginned less than 1,000 bales while the other four had good yields in their territories. One or more gins in each of the other groups had volumes about as large as the larger volumes of the group ginning less than 50 percent of their bales in 21 days.

A major peak of approximately 21 consecutive days is typical with machine harvesting of cotton in Oklahoma, unless weather conditions interfere, or both stripping and picking machines are used in an area. Similar peaks of approximately 21 days were found in the Lubbock area of Texas and in the San Joaquin Valley of California (3, fig. 3 and 4, and p. 22).

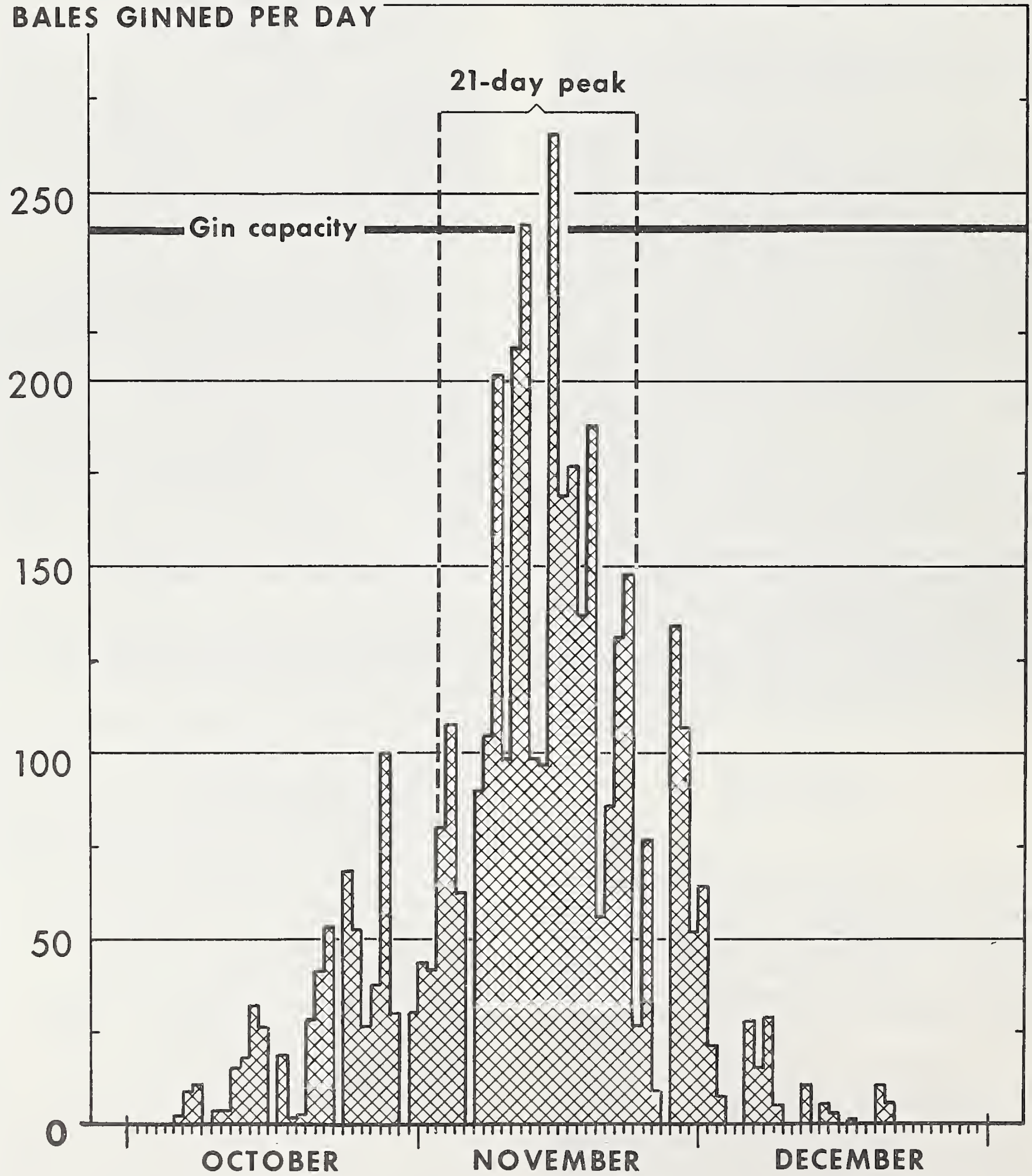
Figure 4 shows the bales ginned each day by an Oklahoma cooperative gin selected to illustrate the peak period and seasonality of cotton ginning. Of its seasonal volume of 4,038 bales, 69 percent was ginned in 21 days--slightly above the average for the group, but lower than for one-third of the gins. The gin had a capacity of 10 bales an hour, and so could gin 240 bales a day, including time for maintenance. Excluding one idle Sunday, it ginned 2,783 bales in the 21 days. It ginned one or more bales on each of 63 days, and there was a crew on the payroll for about 7 more days when no cotton was ginned. Of its volume for the season, it ginned 3,412 bales, or 84.4 percent in 32 days--about half the days it operated.

Table 5.--Percentages of volumes ginned in 21 consecutive days by 43 Oklahoma cooperative gins, 1967 crop[1]

Item	Percentages ginned in 21 days				
	Less than 50.0	50.0 to 59.9	60.0 to 69.9	70.0 to 79.9	Over 80.0
Number of gins in range	5	12	13	11	2
Average of percentages	46.5	53.7	64.4	74.0	83.1
Average of percentage of 43 gins	--	--	62.7	--	--
Average number of bales ginned by gins in ranges	3,924	2,197	1,866	1,911	2,628
Average number of days gins ginned one or more bales	75	55	58	51	48
Average number of days 43 gins ginned one or more bales	--	--	57	--	--

[1] Sundays were included if one or more bales were ginned but omitted when none was ginned, in counting the 21 consecutive days.

FIGURE 4.--GIN CAPACITY, BALES GINNED PER DAY, OF AN OKLAHOMA COOPERATIVE GIN, SHOWING SEASONALITY OF OPERATION, 1967



The bales ginned by days during the 21-day peak by the gin in figure 4 ranged from 41 to 266. Bales ginned equaled or exceeded the calculated capacity (as explained in the appendix) on only 2 days. The bales ginned exceeded half the calculated capacity (or 120 bales) on only 10 of the 21 days and on 3 of those 10 days the number of bales ginned exceeded 120 by small amounts. On 9 of the 21 days, it ginned less than 100 bales; the low-volume days were scattered over the period. This gin operated substantially below capacity. The manager reported that the gin could handle 6,000 bales a season satisfactorily. The daily volume that a gin can handle satisfactorily under current conditions is described and referred to in this report as the volume which the gin can empty from trailers within 24 hours or less. When volumes are larger than that, growers become dissatisfied and likely go to another gin with idle capacity or build another co-op gin. Satisfactory volumes for seasons are discussed in the appendix under gin capacities.

If 65 percent of a 6,000-bale volume for the year is ginned in 21 peak days, 3,900 bales would be ginned. A 10-bale-an-hour plant could gin 240 bales per 24-hour day, or 5,040 bales in 21 days. However, 3,900 bales in 21 days appears more realistic, since cotton is delivered irregularly and growers object to waiting more than 24 hours for trailers. The 3,900 bales exceeds the 2,783 bales ginned in 21 days at the gin in figure 4 by 1,117 bales. If the 1,117 bales were distributed equally over 21 days, they would have averaged 53 bales more per day and the gin could have ginned 53 more bales easily on 17 of the 21 days and probably could have ginned that additional number on 1 or 2 of the other 4 days. That gin could likely have handled the additional 1,117 bales satisfactorily even with considerable irregularity in their delivery. But it is unlikely that it could have ginned 5,040 bales in a 21-day peak because irregularities in delivery would prevent unloading the needed number of trailers within each 24 hours.

The present method of gin operation and the seasonal nature of cotton harvesting would result in actually operating gins for less than 1 month a year for 24 hours a day to gin the largest volume they can handle satisfactorily. For example, a 10-bale-per-hour size gin could gin 240 bales in 24 hours and its largest satisfactory capacity for a season was about 6,200 bales per season (as seasonal capacity was estimated in this report). It could gin 6,200 bales in 620 hours, or 26 days (of 24 hours).

The hourly capacities of the 54 cooperative gins totaled 400 bales. If the 111,885 bales they ginned had been distributed in proportion to gin capacities, they could have ginned that amount of cotton in 280 hours, or 12 days of 24 hours, or 24 days of 12 hours each. Gin machinery is idle over 90 percent of the year when the maximum capacity for a season can be ginned in a month or less.

Seasonality of gin operation arises from the way cotton matures and from the present method of ginning cotton for growers before they sell it and ginning it about as fast as it is harvested, to unload wagons or trailers.

Information on weights of lint and seed and information on the quality of lint obtained by ginning also provides the basis used by growers in selling seed and lint, for delivering lint to cooperatives, or for putting it under Government loans. This method has been widely accepted with little attention given to methods that would reduce or eliminate the seasonality of gin operations.

The influence of the seasonality described above shows up largely in cost of operating labor and depreciation. As stated previously, the 19 high-capacity gins with volumes over 2,000 bales, (averaging 3,735 bales) used an average of 3.1 hours operating labor per bale at an average cost of $5.40 a bale. The manager of the gin for which data are shown in figure 4 averaged 1.9 hours of operating labor per bale at an average cost of $3.25 a bale. He therefore used considerably less labor per bale than most gin managers.

Although the manager of the gin shown in figure 4 used a comparatively low amount of operating labor, over half of it was lost waiting for cotton to arrive. The manager hired only eight men for a shift or crew, although that gin had a capacity of 10 bales per hour. Therefore

he used only 0.8 hour per bale when that gin was operating at capacity, since the eight men could gin 10 bales in an hour. But he averaged 1.9 hours per bale for the season. That was 2.4 times the amount of labor used when operating at capacity rates. So, an average of 1.1 hours per bale was lost or wasted by the gin crew being idle while waiting for cotton.

The relationship of operating labor used during peak periods and for the entire season was less favorable for groups of gins. The 19 high-capacity gins with volumes of 2,000 or more bales averaged 0.95 man-hour when operating at capacity, as stated previously. But they averaged 3.1 man-hours of operating labor for the season or almost 3.3 times as much as when operating at capacity rates. The difference--an average of 2.15 hours--was lost in waiting for cotton to arrive.

The time lost while waiting for cotton to arrive was also substantial at lower capacity gins. The capacities of the eight low-capacity gins, with volumes of 1,000 to 2,000 bales for the year, averaged 1.11 hours per bale when operating at capacity but they averaged 2.7 man-hours for the season. They lost, on average, 1.59 hours per bale while waiting for cotton to arrive.

Average operating labor cost approximately $1.75 per hour. At that rate, 2.15 hours lost per bale while waiting for cotton to arrive at high-capacity gins would amount to $3.76 a bale, and 1.59 hours lost at low-capacity gins would amount to $2.78 per bale.

Directors' and Gin Managers' Views

The views, opinions, knowledge, and beliefs of boards of directors and managers of cooperative gins naturally affect cooperative ginning costs in many ways. This study was not intended to analyze these matters, except where factual data were not available or where supplemental information was needed for the analysis. Consequently, only a few of the more important aspects of their views are discussed.

Both directors and gin managers were aware of the normal relationship of lower costs to large volumes and vice versa. They did not generally see any way of increasing volumes as long as restrictions applied to cotton acreages.

Most managers and directors expressing an opinion on potential ways of reducing ginning costs suggested that co-ops should either install higher capacity gin machinery and reduce labor costs, or get growers to harvest all their cotton in a shorter period so as not to keep gins open so long. They did not believe that growers could all be persuaded to harvest all their cotton in a shorter period, so did not consider that a practical way. It has been tried, but seldom if ever has it been successful. The economic results of installing higher capacity gin equipment, as a means of reducing labor and gin costs was analyzed in a previous section of this report.

A few gin mangers and directors also mentioned consolidation as a potential way of reducing ginning costs, but most of them said location of the new or consolidated gin, personality conflicts, or growers having to haul cotton farther tended to prevent consolidations. Cost of hauling, combining assets, and sales of one or more gins for consolidation are discussed elsewhere in this report.

Several gin directors were familiar with the amount of charges they paid the gin but were not as familiar with their gins' cost of ginning as appeared desirable. They knew their gins made or lost money and most knew about the approximate amount of total savings or loss. But those with very high costs were frequently not any more concerned than those with comparatively low costs. In several cases, directors reported net savings before depreciation was deducted; some of them appeared reluctant to accept depreciation as an expense or cost of the same type as the cost of labor or other gin costs.

Several directors and managers reported they had tried every way they knew to reduce ginning costs and did not see how it could be done. They were looking for ways, either new or old, that would help reduce costs.

POTENTIAL WAYS OF REDUCING GINNING COSTS

Three ways of reducing ginning costs are suggested and recommended for Oklahoma cooperative gins and their members as a result of this study:

1. Control costs at gins where costs average $5 to $10 or more above those of similar gins with similar volumes.
2. Consolidate co-op gins with inadequate average volumes until those remaining have adequate average volumes.
3. Organize a co-op central cotton ginning association with the aid of other Oklahoma and nearby Texas cotton co-ops. That association would test central ginning and if found practical, expand it.

Reducing Costs of Existing Gins

The ginning costs of nearly all cooperative gins were high because of the limited use made of their facilities. Less use is likely made of cotton gins than of nearly all other processing plants in this country. Most plants that cost a quarter- to a half-million dollars are operated more than 1 month a year. But it is known before gins are built that they will likely actually operate continuously less than 1 month a year.

Volumes much below gin capacities for even 1 month further increase ginning costs at Oklahoma cooperative gins. Unforseen declines in cotton production are responsible for some high gin costs. But such examples indicate that very careful consideration is needed before new gins are built or existing gins are replaced or extensively modernized.

Controlling Costs at High-Cost Gins

Of the 54 gins, 16 had average per bale costs that ranged $5 to more than $20 higher than other gins with like capacities and similar volumes. These costs were checked against the appropriate curves in figure 3; also by locations of dots (or symbols) for specific gins. Seven of the 16 high-cost gins (by $5 or more per bale) were high-capacity and the other 9 were low-capacity. However, five of the nine gins from the low-capacity group had high-capacity stands but insufficient numbers to increase capacities over 7 bales per hour.

Higher-than-average cost for labor contributed to the higher-than-average costs for 14 of the 16 gins. Labor costs averaged over $10 per bale at 4 of the 14, and over $7 per bale at 9 of the 14. Four gins with higher-than-average labor costs for comparable gins had volumes over 3,000 bales.

Depreciation was a contributing factor--higher than for similar gins with similar volumes--at 10 of the 16 high-cost gins. Depreciation exceeded $10 per bale at 7 of 10. Once a gin is built or remodeled, it is difficult to reduce depreciation per bale except by ginning more bales. Selling the gin may be the best solution in some cases.

Managers' or office salaries were higher than for comparable gins at 12 gins; 4 of these gins had both higher managers' and office salaries.

Repairs were higher than for comparable gins at 5 of the 16 gins. Higher-than-average charges for utilities contributed to high costs at 3 of the 16 gins. Other costs were higher than for comparable gins at 10 of the 16 gins.

Members, directors, or gin managers can use figure 3 as a current check on total costs for ginning at their gins. The capacity data in the appendix of this report can be used to determine gin capacities like those used for developing figure 3. Cost to gins for bagging and ties of about $3 per bale was included in data used for the curves.

If costs rise, the data in figure 3 will become obsolete. Yearly comparisons made by the Wichita Bank for Cooperatives can be used for checking costs.

Comparisons of detailed costs for 2 or more years at a given cooperative gin are useful sometimes. But the value of such comparisons are limited, because the level of costs may have been too high for all the years, compared with other gins. The comparative level of a gin's costs would not be indicated by self-comparisons over time only.

Specific reasons for excessively high costs, if any, could not be determined from the data available for this study. However, the costs of a few cooperative gins were so high in 1967 that carelessness or negligence may have been involved. If members, directors, or managers do not control excessive gin costs, some co-op gins will be forced to stop operating within a few years.

Consolidations

Several mergers or consolidations have been discussed or considered in Oklahoma during the past 5 years, but very few have actually taken place. Most of the discussions reported were on mergers of cooperative gins, but a few involved a cooperative and a company or an individually owned gin.

In this report, the terms "consolidate" and "consolidation" include mergers, acquisitions, and combinations of management and facilities. These terms also include the sale of assets by a co-op and the change of its members' patronage to another or other cooperatives. The effects of these different methods of consolidation will be discussed later in this section.

The number of recent consolidations is too small to report detailed costs without disclosing individual operations. But limited information from recent consolidations, together with some older information, indicates that consolidations can reduce ginning costs in some but not all situations, so some general statements, indirect comparisons, and examples will be used instead.

Figure 3 showed the average approximate cost and volume relationship for Oklahoma cooperative gins. Interpolations from figure 3 are shown in table 6 for volumes of 1,000 bales and increments of 500 bales to the largest volumes for which data were available. The largest volumes were nearly 3,500 bales for low-capacity gins and nearly 6,000 bales for high-capacity gins. The costs for all gins are somewhere between those for low- and high-capacity gins since costs of those two groups were combined to develop cost curves for all gins. However, on volumes over 3,500 bales the cost curves for high-capacity gins and all gins approach each other closely.

Ginning costs on volumes of less than 1,000 bales for low-capacity gins and less than 2,000 bales at high-capacity gins were so high that gins expecting to average such volumes urgently need to consolidate, sell, or otherwise dispose of their gin equipment, buildings, and land quickly. This comment is based on an economic viewpoint: sentiment or other factors may determine actions of members, directors, and gin managers, rather than economic considerations. However, members need to recognize that continuing the operation of either high- or low-capacity gins on such low average volumes will generally mean no savings from current charges for ginning, gin margins on cottonseed, oil-mill refunds, and miscellaneous income combined. Furthermore,

Table 6.--Estimated average ginning costs per bale for Oklahoma cooperatives from cost curves in figure 3, for high- and low-capacity gins and for 53 gins from figures 2 or 3, 1967 crop[1]

Annual volume in bales	Cost of--		Average costs for 53 gins
	Low-capacity gins	High-capacity gins	
1,000.......	$36.17	$44.30	$38.90
1,500.......	30.40	37.12	33.76
2,000.......	26.88	32.75	30.53
2,500.......	24.43	29.72	28.24
3,000.......	22.59	27.45	26.50
3,500.......	21.15	25.66	25.11
4,000.......	---	24.21	23.96
4,500[2]......	---	23.00	23.00
5,000[2]......	---	21.97	21.97
5,500[2]......	---	21.08	21.08
6,000[2]......	---	20.29	20.29

[1] One gin of the 54 surveyed was omitted since its costs were exceptionally high and beyond graph scale.
[2] Estimated average costs for all gins on volumes of 4,500 bales and over were approximately the same as those for high-capacity gins. Since only high-capacity gins had volumes of those sizes in 1967, estimated costs for high-capacity gins were used for all gins with 4,500 bales and over.

it will likely also mean that the equities of the present and former members will be used up in meeting current costs as well and it is only a matter of time until the gin will be forced to stop operating.

Effects of Consolidations on Costs

The costs and volume relationships shown in table 6 will be used in some examples that follow to indicate the reductions in costs of ginning that should result from consolidations with average management when volumes are combined and surplus gins are sold, dismantled, or moved out of the area. The examples cover only costs of ginning. The additional costs of hauling to consolidated gins, other problems, and other factors closely related to gin consolidations will be discussed later. It is assumed that consolidated gin cost per bale is equal to the averages indicated in table 6 and by curves in figure 3.

If three low-capacity gins near each other with volumes of 1,000 bales and costs of about $36 per bale, as in table 6, consolidate their volumes and sell two of their gins, to be moved or dismantled, they could expect ginning costs of about $23 per bale after the consolidation. That would be a $13 per bale reduction in gin costs. If only two such gins with 1,000-bale volumes consolidated and sold one of their gins, they could reduce costs to about $27, or by $9 a bale.

High-capacity gins with less than 2,000 bales have a volume problem. They, like low-capacity gins with less than an average of 1,000 bales, have an acute problem from an economic viewpoint and need to make a major change. If three adjacent high-capacity gins with 1,500-bale volumes consolidate their volumes and sell two gins, they could expect to reduce ginning costs by about $14 per bale--$37 to $23. If only two such gins consolidate volumes and sell one gin, they could expect to reduce costs by about $10 a bale--to $27.

High-capacity gins with somewhat larger volumes can also reduce ginning costs by consolidating. For example, according to table 6, two high-capacity gins with volumes of 2,500 bales could consolidate volumes, sell one gin, and reduce ginning costs from $29.72 a bale to $21.97 or by about $8 a bale. Even two high-capacity gins with 3,000-bale volumes could likewise reduce ginning costs by about $7 a bale.

Combinations of high- and low-capacity gins could reduce ginning costs in similar ways. For example, a high-capacity gin with a volume of 2,500 bales and two low-capacity gins with 1,500 bales each could consolidate volumes, sell the two low-capacity gins, and reduce ginning costs by about $9 per bale. Such consolidations may be even more desirable if the equipment of the low-capacity gins needs replacing soon.

In the preceding discussion, it was stated that volumes were consolidated. This assumption was made to keep the calculations and comparisons simple. It is recognized that the members decide where they will take their cotton for ginning.

The cotton that went to a gin that is dismantled or moved from the area may split and go to various co-op gins, rather than to one specific co-op gin. Splitting volumes is a problem when mergers of assets are attempted. Split volumes of discontinued gins may require additional consolidations to get volumes of the remaining gins nearer optimum levels.

It was also assumed that the gins sold in the consolidations were sold under a contract requiring removal from the area or that they were to be dismantled. If gins included in consolidations were sold but not moved out of the area or dismantled, a different situation would exist and the results indicated above likely would not apply.

In some consolidations of two co-op gins or a co-op gin and a company or individually owned gin, the co-op continued to operate both gins after the consolidation. Apparently, there was very little if any reduction in ginning costs in these instances. Comparatively little difference in ginning costs were found in

California and Texas between single- and two-gin plants, even when both were on the same gin yard (3, pp. 8-13). The fixed costs continued on both gins as did maintenance and some of the other costs. Supervisory problems may arise if gins are separated. Better management of such consolidated plants may permit savings, if there are to be any.

Both gins have been kept in some cases and operated to handle satisfactorily the maximum amount of cotton expected, such as when a bumper crop is produced. Carrying surplus gin capacity is expensive however (5, p. 17).

One example of this, out of many that could be developed from table 6, follows:

Assume the members patronizing a cooperative gin with a 3,500-bale capacity average 2,500 bales in 4 of 5 years but in the 5th year, the members produce 5,000 bales. Should they install a high-capacity gin or continue with their low-capacity gin and gin the 1,500 bales overflow at some other gin that has idle capacity? Using costs and volume data from table 6 and a gin charge of $20 per bale for the overflow (the approximate ginning charge on machine-stripped cotton in Oklahoma for 1967) the following costs result:

This difference would be increased by the interest on the additional investment in the high-capacity gin, but reduced by the gin margin on cottonseed for the 1,500 bales, cash portion of co-op oil-mill refunds, plus discounted value of the portion of refunds retained by the oil mill. However, the gin margin on cottonseed and oil-mill refunds would have to exceed $39 per bale on the 1,500 bales ($58,725 ÷ 1,500 bales = $39.15), plus the interest on the additional investment, or continuing with the low-capacity gin would result in lower costs. The gin margin and oil-mill refunds would be available to the high-capacity gin on all 15,000 bales produced, but also available to the low-capacity gin on 13,500 of the 15,000 bales.

This is only one example; it shows that care is needed in estimates of future volumes and in calculations. Interest on the additional investments required for high-capacity gins is not included in the costs in table 6. Data were not available for determining the additional investments required to change a specific low-capacity gin to a high-capacity gin. However, original investments averaged approximately $60,000 more per gin for high-capacity gins than for low-capacity gins. Interest at 6 percent would amount to $1,800 per year on the average investment (one-half of original additional investment of $60,000). On that basis, $9,000 would need to be added to the difference of $58,725 in the above example for interest

<u>Continuing with low-capacity gins</u>:

4 years x 2,500 bales = 10,000 bales @ $24.43	=	$244,300
1 year x 3,500 bales (of 5,000 produced) @ $21.15	=	74,025
1,500 bale overflow @ $20 charge at another gin	=	30,000
Total costs		$348,325

<u>Installing a high-capacity gin</u>:

4 years x 2,500 bales = 10,000 bales @ $29.72	=	$297,200
1 year of 5,000 bales @ $21.97	=	109,850
Total costs		$407,050

Difference: $407,050 - $348,325 = $58,725 lost by installing a high-capacity gin to handle one large crop in 5 years.

alone. Other fixed costs were not included. Interest would increase the amount needed from gin margins on cottonseed and oil mill refunds by $6 a bale ($9,000 ÷ 1,500 = $6) or to a total of $45 a bale. Installing the high-capacity gin would have increased the average cost per bale for the 5 years by $4.50 a bale on the 15,000 bales ($58,725 + $9,000 = $67,725 ÷ 15,000 = $4.51).

A model or budget approach was used for the preceding comparisons. However, the data used in the approach (from table 6 and figure 3) were developed from actual gin operations. Consequently the differences indicated reflect what can reasonably be expected under current price levels and with average management. This or similar calculations would provide a guide for choosing among the alternatives.

Hauling costs

In the interviews with gin managers and directors, the barrier to gin consolidations reported most often by both was the greater distance growers would have to haul their cotton. Information was collected on the distances and ways cotton was hauled to gins in 1967 and on some of the costs of hauling. Analyses of those data follow.

In Okahoma, nearly all cotton is hauled to gins in trailers pulled by pickups. Estimates by gin managers indicated that 96 percent of trailers were pulled to gins with pickups, 2 percent by tractors, 1 percent by cars, and 1 percent by trucks (1 ton or larger). Over 90 percent of the pickups were estimated by gin managers and reported by directors to be 1/2-ton size. Forty-four of 45 directors owned 1/2-ton pickups. One had a 3/4-ton pickup only, and two of those owning 1/2-ton pickups also had 3/4-ton pickups.

The trailers used for hauling cotton to gins had capacities for one to six bales. Gin managers' estimates indicated an average of 61 percent of cotton was delivered to the gins in two-bale size trailers; 18 percent in three-bale size; 13 percent in one-bale size; 6 percent in four-bale size; and 1 percent each for five- and six-bale sizes.

Random samples of about 10 percent of the growers were taken at each of 38 co-op gins in the survey and the approximate distance each hauled cotton to the gins was obtained. The average distance one-way for the 496 growers was 7.3 miles. At 12 of the other 16 gins where samples were not taken, the gin managers estimated the average distances their members hauled cotton to their gins and these estimates averaged 7.7 miles. The greatest distance any grower in the random samples hauled cotton was 52 miles, but the longest distance for each of the 38 gins averaged 16.6 miles and ranged from 3 to 52 miles.

Costs of hauling and the distances involved become important in analyzing distance as a barrier to gin consolidations; they will be discussed next.

This survey indicated that most cotton growers in Oklahoma now use a pickup in their farming operations or hire custom operators of cotton harvesting machines who have pickups and trailers and haul the cotton they harvest for the growers. Under these conditions, practically all of the costs for hauling cotton longer distances, as to consolidated gins, would be the variable costs of operating the pickups and in some cases costs for hiring drivers of pickups. Overhead costs for depreciation, taxes, and other items would be increased very little by the additional mileage, which would be mostly on hard-surfaced roads. Repairs would be slightly higher.

Basic data on variable costs for pickups when used for hauling cotton are shown in appendix table 10. Estimated costs per 100 miles and per mile for hauling seed cotton additional distances are shown in table 7. The variable costs for gasoline, oil, filters, and tires were estimated to average 3.85 cents per mile.

The cost for the drivers of pickups would depend on specific situations. If pickup drivers would have been idle otherwise for the additional time required to haul the cotton the greater distance, there would appear to be no logical basis for charging any of their time to hauling the cotton greater distances. If a man must be hired to haul the cotton the additional

distance, even more than the portion of time involved in the added distance could logically be charged to hauling. The most common situation is somewhere between these two. If the driver is paid $1.75 per hour, the cost of his time would add 6.14 cents per mile to the cost of hauling seed cotton greater distances, according to table 7.

The variable pickup costs and the drivers' wages shown in table 7 total approximately 10 cents a mile. If two bales are hauled, costs for hauling additional distances would equal 5 cents a mile each way per bale, or 10 cents a mile per bale one way. At that rate it would cost $1 per bale to haul seed cotton to a consolidated gin 10 miles further away. Larger loads would reduce the costs.

Distances from the 54 co-op gins to co-op gins closest and second closest to them were as follows:

Distances (Miles)	Closest (No. of gins)	Second closest (No. of gins)
10 or less	28	2
11 - 15	15	34
16 - 20	7	7
21 - 25	1	4
26 - 35	3	1
36 - 50		3
51 and over		3
Total	54	54

The range in distances between the closest co-op gins was 0.5 to 33 miles, averaging 11.8 miles. Over half of the gins were within 10 miles of the closest co-op gin and four-fifths were within 15 miles.

The range in distances to the second closest co-op gin was 8 to 60 miles and the distance averaged 17.8 miles. Six of the second closest gins were remotely located from other gins--over 35 miles away. If the distances for these 6 gins are excluded, the average distances of 48 second closest gins drops to 14.4 miles. Two-thirds of the second closest gins were within 15 miles of other gins.

Table 7.--Estimated variable costs for hauling seed cotton additional distances as to a consolidated gin rather than present gins, in Oklahoma, 1967 crop[1]

Items	Costs per 100 miles
	Dollars
Costs for gasoline[2]	3.678
Cost of oil	0.091
Cost of filters	0.080
Cost of tires	0.005
Total variable pickup costs	3.854
Cost of pickup driver[3]	6.140
Total, pickup costs and driver	9.994

Rounded amounts:

Variable pickup costs $3.85 per 100 miles or 3.85 cents per mile.
Variable costs for pickup driver $6.15 per 100 miles or 6.15 cents per mile.
Variable pickup and driver costs $10 per 100 miles or 10 cents per mile.

[1] Costs, except for price of gasoline and pickup driver were calculated from averages shown in appendix table 10.

[2] Price of gasoline assumed to be 32 cents per gallon and 8.7 miles obtained per gallon.

[3] Wage rate assumed to be $1.75 per hour which was about the average wage rate paid by gins, including social security and insurance on employees. At an average speed of 28.5 miles, the cost of the driver's wages would be 6.14 cents per mile.

In the preceding examples where volumes were assumed consolidated and part of the gins dismantled or moved from the area, costs were reduced by $7 to $14 per bale. Hauling costs of 10 cents per bale one way (or 5 cents per mile per bale both to and from gin on two-bale loads) would total $1 to $2 per bale on a large part of the cotton. These amounts could be deducted from $7 to $14 per bale and still leave substantial overall reductions in consolidated ginning costs. The distances between cooperative gins indicate many potential opportunities for consolidations in Oklahoma. The gin charges, gin margins on bagging, ties, and cottonseed, and oil-mill refunds would remain approximately the same as before consolidations.

Problems of Consolidation

Consolidation of cooperative gins by combining their assets through mergers or acquisitions has occurred in a few cases. But one or more of several problems are often encountered. If assets are merged, a common problem is disposition of buildings, equipment, and land. If both gins continue to operate, little or no economic benefits may be realized. If

assets are merged into a new plant, a problem is likely to arise as to where to locate it. If the consolidation is by an acquisition or merger, the value of the assets often becomes a problem. Another limitation on gin consolidations is that all the members of the merged or acquired gins may not deliver their cotton to that co-op because their farms are closer to another co-op gin in a different direction or for other reasons.

A few Oklahoma gins have found a practical way for avoiding the usual problems of consolidations by mergers or acquisitions. This consists of gins with low volumes selling their assets for the best price they can get and distributing the proceeds according to the equities held by their members. Then the members of the dissolved co-op join other co-op gins. Most co-op gins in Oklahoma can gin considerably more bales than they currently receive and so are glad to get more cotton.

One Oklahoma co-op had a gin almost paid for. That gin could have continued operating for several years. But the manager, director, and members recognized that volumes would be low, that there would be little if any savings, and the members' equities would eventually be used up in operating the gin. So they sold the gin equipment, gin building, and part of the land. They donated the scales, office building, and remainder of land for community use, such as for farm women's club, and liquidated their other assets, such as equities in regional co-ops. They paid face value on all common and preferred stock and then paid cash of over 80 cents per $1 on all other equities of their members. The active growers then took their cotton to other co-op gins. Many growers received $100 or more from their equities, and some of them received over $1,000 each. This may be a more favorable liquidation than many gins could obtain. But even 25 to 50 cents per dollar on equities is preferable to none. Members currently growing cotton and patronizing low volume gins also give up the savings they could obtain at co-op gins with adequate volumes.

Another Okahoma cooperative gin association also liquidated its assets several years ago and its members joined and patronized other co-op gins. But the volumes of some of the co-op gins they joined are so low now that those gins also need to liquidate their assets and distribute the proceeds.

The procedure followed when co-op gins liquidate their assets, pay the proceeds to members on their equities, and the members join other co-op gins, is considered a type of consolidation in this report. This procedure is different from what is commonly thought of as consolidations, such as mergers, acquisitions, or combinations of assets by two or more co-ops. When this procedure is followed, members receive the market value for the assets of the discontinued gin and they avoid many of the problems common with the other methods of consolidating.

Combining volumes at consolidated gins and realizing reductions of $7 to $14 in ginning costs, less $1 or $2 per bale for hauling a longer distance, results in reductions of $5 to $12 a bale. The weighted ginning costs for a year like 1967 could be reduced from $29 to $24 or less a bale. Larger reductions would occur for gins with above-average costs.

Other Considerations

Economic efficiency is important but other factors are often involved in actual operations. For example, subjective values of growers and others may delay consolidation of co-op cotton gins or act as barriers to consolidations. Among the subjective values influencing co-op cotton gin consolidations are community pride, sentimental attachments, and convenience. However, the preceding analyses on consolidations and hauling and some of the following sections indicate the cost of these factors. In effect, a price tag can be attached to them.

In this study no attempt was made to evaluate directly the importance of community pride or growers' sentiments attached to low-volume co-op gins. Consolidated schools have been closed and the children bused to larger town or city schools. Many country and small-town

churches have closed, as have many country stores and many stores in small towns. Members and some other people may want to keep co-op gins with low volumes without considering fully all the consequences.

When volumes are so low that costs exceed revenues, equities of past member-patrons are being used up to provide convenience for current patrons. Current patrons also pay for convenience through sacrificing savings they could get from ginning at consolidated gins with adequate volumes.

Members who own equities are directly concerned with what alternative is chosen at co-op gins with low volumes. Equity owners include most current patrons and many former patrons who have retired, moved away, or died and left estates. Some other people, such as nearby storekeepers, also may be interested in what is done about such gins.

The members of low-volume co-op gins face the following questions:

1. Are the benefits of low-volume, high-cost co-op gins to community pride, sentiments, and convenience worth the costs?
2. Would consolidating be the best solution?
3. Or is there a better way than continuing with low volumes or consolidation?

Central Ginning

One alternative, which may be new to some growers, is central ginning. It appears to be a low-cost way or method of ginning cotton where growers sell or dispose of their cotton before it is ginned or as seed cotton.

Co-ops, merchants, other gin owners, or operators acquire and store enough seed cotton during the harvesting season to keep the central gins operating at capacity for several months each year.

Central ginning is new to this country, but it is widely followed in most other cotton-producing countries. It has been estimated that over 90 percent of cotton in other countries, excluding Mainland China, was sold as seed cotton and that 85 percent of that sold as seed cotton was ginned by the central method in the 1965-66 season (6, p. 3). Over 50 percent of the 1965-66 world cotton crop (including the United States but excluding Mainland China), was estimated to have been ginned by the central method. Data were inadequate for estimating percentages for Mainland China, but indications were that central ginning was likely followed there also.

Sales of seed cotton are based on weights in foreign countries, but the use of quality factors in sales varies from very little to the use of standards for seed cotton grades and Government classification of seed cotton.

Sales of seed cotton for central ginning in the United States probably will be based on weight of the seed cotton and analyses of representative seed cotton samples for lint, seed, and moisture percentages and quality of fibers.

The gins following this method are called central gins because they are often located near centers of large cotton-producing areas or at central market points between producing areas and mills or ports in foreign countries. They would likely also be located at similar locations in the United States to lower transportation costs, especially for seed, and to facilitate blending and ginning the cotton.

The basic principles of central ginning are widely practiced in foreign countries. But application of central ginning in the United States will require different procedures and practices in seed cotton analysis for determining percentages of lint and moisture and quality of fibers.

Some information on procedures and practices for central ginning are already available in the United States. Practices and equipment used by agronomists in cotton breeding work can be adapted for ginning samples of seed cotton for central ginning. Seed cotton has been baled with hay balers and other types of balers, but some additional information and improvements will likely be needed. A few comparatively low-cost experiments may provide everything necessary.

An example of information that is needed for central ginning and which may require experiments is: Do central gins need receiving stations, or can cotton be handled more economically by equipping harvesting machines with extractors and balers? In view of the investment required for receiving stations and their operating costs, co-ops should try both of these methods at the same time to speed up the testing. The more efficient procedure could then be used sooner.

The testing phase could perhaps be completed in one or two seasons. The costs for testing would be moderate or low, if conducted in cooperation with a substantial number of growers and their cotton cooperatives.

Standard items of gin equipment, except balers, and perhaps the unloaders, could be used for receiving stations. Manufacturers are testing extractors on cotton harvesters and might test or at least cooperate in testing balers on harvesting machines. The cooperative compress-warehouse would perhaps store the seed cotton and a lease arrangement could be made for the use of a cooperative gin near the warehouse for ginning the cotton, if building a central gin plant is not considered advisable during the first season.

The present cooperative gins would get some advantages from early participation in testing central ginning. Among these would be that the central gin could assist in selling the assets of cooperative gins that were discontinued, or it might buy some good used gin equipment for its own use. And central gins could use many former employees of cooperative gins.

In the survey, it was found that two-thirds of the gin managers were 50 years or more of age and almost one-third were 60 or more years of age. Consequently many of them may retire by or before the time when central ginning is tested and put in use. Information was not obtained on the ages of the ginners, but observation indicated many of them are also near retirement age. Most other workers at gins were temporary employees and many work only one season or less. Central gins, if successful, may not be able to get enough employees from discontinued cooperative gins to supply their requirements, even if they pay higher salaries and wages.

Two examples of ways that central gins may operate in this country are used later in cost comparisons and brief descriptions follow. For more details on central gin operations, see (4 and 6).

Example 1, with receiving stations:

The receiving stations of central gins would be located at points convenient to growers and where volumes were large enough to justify operation of receiving stations. Some gins might be converted into receiving stations. The receiving stations could be equipped with high-capacity unloading, cleaning, and extraction equipment and have scales, sampling, and baling equipment. Growers would deliver their seed cotton to receiving stations as they now deliver it to gins. There it would be unloaded, most of the burs and trash removed, and the seed cotton would be sampled, baled, and hauled to a warehouse.

Samples would be ginned on laboratory-size gins, equipped with cleaners, extractors, and lint cleaners. The lint and seed percentages from the samples would be used in calculating amounts of lint and seed in the loads delivered by the growers. And the lint from the sample, would be classed for quality. Growers' sales, or deliveries to cooperatives, would be on the basis of seed and lint weights and quality of the lint.

Example 2, without receiving stations:

Estimates of costs assume that bur and trash extractors, which some manufacturers currently include on some models of their cotton harvesting machines, prove satisfactory. It is also assumed that standard automatic hay balers or giant hay balers, such as those developed by agricultural engineers at Iowa State University, can be modified and used to replace cotton baskets on cotton stripping and picking machines. Reports on extractors used in 1967 were favorable. Seed cotton has been baled with hay balers, but modifications and improvements are needed.

If, or when, balers are added to cotton harvesting machines equipped with practical extracting units, growers can haul or hire their seed cotton hauled directly to warehouses at central gins. Receiving stations would not be needed. The baled seed cotton would be hauled like hay and sampled upon delivery to the warehouses.

Samples of seed cotton would be analyzed by ginning and classing for quality as described above for the central gin with receiving stations.

This system would have other advantages besides eliminating investments in and cost of operating receiving stations. Leaving burs and trash in fields may be worth $1 or more per bale for humus, and reduces the trailer space required, the weight, and the costs of hauling seed cotton. There may be another advantage from extracting burs and trash in the fields, in that these foreign materials would be removed before they are thoroughly mixed with the seed cotton. As a consequence, the lint may be cleaner and grade better.

The disadvantages of harvesters equipped with extractors and balers is that they will cost more to buy and operate. But the added costs would likely be less than the savings.

Estimated Costs of Central Gins in Oklahoma

Since there are no central gins now operating in this country, data from actual operations were not available for Oklahoma or for the United States. As previously indicated, estimates of costs for central ginning for the Lubbock area of Texas were developed in (4 and 6). The estimated costs of central gins in the Lubbock area of Texas were adjusted so they would represent 1967 price and cost levels per bale in Oklahoma (table 8). Central gins with and without receiving stations were included. The estimated ginning costs totaled $10.50 per bale for the central gin both with and without receiving stations. The differences in their operations and costs appear later in receiving station costs and in interest on investments (table 8).

Cost Comparisons

Weighted costs of the 54 gins surveyed for this study and for 10 of these gins called "consolidated gins" were also included in table 8, to facilitate comparisons with central ginning costs. The costs for "consolidated gins" are shown as estimated costs, but they are weighted averages of the actual costs reported by 10 of the cooperative gins in the survey with single gins and volumes of 3,000 to about 5,600 bales. Their volumes averaged 4,100 bales, which could be ginned by growers that consolidated low-volume gins, sold one or more surplus gins, and operated one large low-capacity gin or a high-capacity gin. That volume would equal only two-thirds the capacity of a 10-bale-per-hour, high-capacity gin and would be near the minimum volume needed for a gin that size. It would be the maximum volume for a 6.5-bale-per-hour, low-capacity gin.

Some costs, other than those for ginning, were included because ginning costs alone do not cover all joint and related costs for the different gins (table 8). Receiving station cost for central gins using them is one example. Additional hauling cost was included for consolidated gins to cover the cost to growers of hauling part of the cotton further. Additional hauling cost was also included for central gins partly to cover the estimated weights of burs and trash remaining in baled seed cotton that would be removed at conventional gins and partly to cover cost of hauling pallets assumed used for handling and storing baled seed cotton. Storage and compression costs were included because they differed for conventional and centrally ginned bales. Storage costs were higher for storing seed cotton and centrally ginned bales than for conventional bales but compression with high-density gin presses reduced the total storage and compression for central gins below that for conventional gins (6, pp. 42-44).

Table 8.--Costs per bale of ginning cotton at 54 cooperative gins, estimated costs for consolidated cooperative gins and for cooperative central gins, with and without receiving stations, including estimated costs per bale for storage and compression in Oklahoma, 1967

Item	Average cost per bale of 54 gins on 111,885 bales[1]	Estimated cost per bale for consolidated gins[2]	Estimated cost per bale for central gins, 36,000 bales per gin[3]	
			With receiving stations	Without receiving stations
	Dollars			
Ginning costs per bale:				
Managers' salaries...............	2.58	1.53	0.50	0.50
Office salaries..................	1.45	1.35	0.75	0.75
Labor (for gin operation)........	5.26	4.60	1.75	1.75
Utilities (power, fuel and water)	1.93	1.80	1.00	1.00
Repairs and gin supplies (includes repair labor)........	3.31	3.06	1.50	1.50
Bagging and ties.................	2.94	2.94	2.75	2.75
Depreciation.....................	7.04	4.96	0.65	0.65
Taxes (property).................	0.56	0.28	0.06	0.06
Insurance (property).............	0.43	0.26	0.04	0.04
Other (telephone, office supplies, auditing, meetings, travel, etc.).................	3.68	3.02	1.50	1.50
Total ginning costs..........	29.18	23.80	10.50	10.50
Estimated receiving station cost...	None	None	4.00	None
Additional cost for hauling........	None	[4] 0.40	0.25	0.25
Analysis of seed cotton sample (ginning portion)................	None	None	0.25	0.25
Estimated storage cost to April 30 and compression cost............	4.25	4.25	3.50	3.50
Total ginning, storage, and compression cost...........	33.43	28.45	18.50	14.50
Interest on 1/2 of original investment @6% [5]...............	2.90	1.90	0.68	0.30
Total, including interest....	36.33	30.35	19.18	14.80

[1] Costs per bale were calculated by adding costs of the items for the 54 co-op gins and dividing by the 111,885 bales the gins processed from the 1967 crop--an average of 2,072 bales per gin.

[2] The costs of 10 single gins with 3,000 bales or more were added and divided by the 40,840 bales they ginned to determine the per bale cost. They averaged 4,084 bales, which was rounded to 4,100 bales.

[3] Estimated costs for central gins were developed by taking the estimates used in (6) and adjusting them for increased wage rates and other factors to put them on the 1967 level of costs. See (4) and (6) for more details on development of costs before they were adjusted.

[4] Additional hauling costs of consolidated gins calculated on basis of one-third of 4,100 bale volumes of consolidated gins being hauled 12 miles further than before consolidations, at a cost of 10 cents per mile, one-way.

[5] Interest on investment is a return to capital rather than an expense item, but it is included here because of the substantial differences in investments per bale for different operations.

Interest on investment is a return on capital rather than an expense, like the other costs, but it is included here in recognition of the wide differences in investments required for the different kinds of gins in table 8.

Consolidation reduced total costs to $30.35 or by $6 per bale from the weighted average cost of $36.33 for the 54 gins (table 8). The central gin with receiving stations was estimated to have a total cost of $19.18 or about $17 less per bale than the 54 gins. And the central gin without receiving stations had an estimated total cost of $14.80 or about $21.50 per bale less than the 54 gins. Total costs were about $11 and $15 less per bale for the central than for consolidated gins. The total costs were $4.38 less per bale for the central gin without receiving stations than for the central gin with them. These costs include ginning costs and other costs directly related to ginning.

A few other factors need to be included to cover the economic relationships and interests of Oklahoma cotton growers who are now members of cooperative gins. One is that most members of Oklahoma co-op gins own equities, through their gins, in the cooperative cottonseed oil mill in Oklahoma City. Most of these growers also own equities in the cooperative compress and warehouses at Altus, Okla. Naturally, they want to continue using both facilities. A co-op central gin would likely be located at or very near one of these facilities. If located at some other place, it would increase trucking costs.

The separate locations of the oil mill and warehouses would increase the trucking costs, if both facilities are used. Such increase in trucking costs with a central gin located at oil mill or compress, may range between $1.25 and $1.75 per bale. That would have the same effect as increasing the total costs for central gins in table 8 by about $1.50 per bale.

However, after allowing for such increase in costs for trucking, total costs for central gins shown in table 8 would be about $15 and $20 less per bale than for the 54 gins and about $9 and $14 less per bale than for the consolidated gins. If central ginning proves successful, location of facilities could be studied later as a way of reducing hauling costs.

Another factor of concern to cotton growers, but not covered in table 8, is that the estimate for the central gin without receiving stations is based on the assumption that cotton harvesting machines will be equipped with bur and trash extractors and baling attachments. This means the costs of new harvesting machines and costs of operating them will likely increase somewhat.

A large part of the Oklahoma cotton is now harvested by custom operators. Both custom operators and larger cotton growers could spread the additional costs of harvesting machines equipped with extractors and balers over enough cotton to lower extra costs for extracting and baling.

The use of cotton harvesters equipped with extractors and balers would make unnecessary the investments in receiving stations. Cost in table 8 were based on an original investment of $450,000 in receiving stations for 36,000 bales which equals an original investment of $12.50 per bale. That amount could be used for equipping harvesters with extractors and balers and leave total investments at the same level as for gins with receiving stations.

Central gins could blend seed cotton and make bales within lots more uniform. The value of such improved uniformity is unknown, but it may be worth $1 to $5 per bale. And central gins can dry or humidify cotton slowly and preserve fiber qualities. The value of this is also unknown. But improved conditioning and blending should at least improve the competitive position of such cotton.

The differences in costs estimated in table 8 for central and conventional gins are much wider than those estimated in previous studies (4 and 6). The differences in costs of the central gin with receiving stations and the 54 gins and consolidated gins of conventional types were wider than in previous studies largely because of two factors. One of these factors was that the volumes of the 54 gins (averaging 2,072 bales) were only about 45 percent of their

satisfactory capacities and the 4,100 bales average of the consolidated gins was only about 67 percent of their capacities. In the previous studies, the 6,000-bale volumes used for the conventional gins were close to the maximum satisfactory capacities for the 10-bale-an-hour gins.

The other reason for wider differences was that price levels have increased and the increases were greater for conventional than for central gins. For example, the wage rate per hour used in this study was $1.75, or 25 cents more per hour than the $1.50 per hour used in previous studies. The 54 gins used an average of about 3 hours per bale, consolidated gins used about 2.6 hours, and the central gins were estimated to use 1 hour. Consequently labor costs would be 75 cents per bale more for 3 hours than at the previous rate and 65 cents more on 2.6 hours, but only 25 cents more for the central gins. This same kind of relationship applied to some of the other costs. An interest rate of 6 percent was used instead of 5 percent. More labor is used for conventional compression than would be needed for compression at central gins.

Central gins of the size assumed in this study could gin 36,000 bales in 5 to 7 months. Consequently, this volume is only about 50 percent of their maximum capacity.

As stated early in this report, three of the 54 cooperative gins had ginning costs of less than $20 per bale and five others had costs between $20 and $25 per bale. Five of the eight were among those included in the 10 gins selected as consolidated gins for illustrative purposes. The management of some of these appeared better than average and their volumes were at fair to high proportions of their capacities. Therefore they would not have much if any need for consolidation. But if their volumes should decrease, consolidation would be appropriate in these cases also.

The members of the eight cooperative gins with the lower costs in table 1 and especially the three with costs of less than $20 per bale may appear, when first observed, to have little or nothing to gain from central ginning. However, their average ginning costs per bale and the last totals in table 8 are not comparable until some additional costs are added to costs in table 1.

To get ginning costs like those in table 1 comparable to those in table 8, compression and storage costs and interest on average investment need to be added. Costs for these gins are likely similar for storage and compression to those shown in table 8 for the 54 gins and consolidated gins. Interest on investments may differ because of different original investments and different volumes. But storage, compression, and interest on investments are likely to total between $5 and $6 per bale.

On the basis of $5 to $6 per bale for those costs, growers who were members of the three gins with the lowest costs would lower their costs by about $3 to $4 per bale at the central gin using receiving stations (table 8).

The preceding comparison does not include any allowance for above-average management of these three gins and average management assumed for the central gin. Neither is any gain in value from blending and improved handling at central gins included. Only the $5 to $6 for compression, storage, and interest on investment is added to the $17, making a total of $22 to $23. Those amounts are comparable to the $19.18 for the cental gin with receiving stations in table 8. Other comparisons would be needed for the central gin without receiving stations.

RECOMMENDATIONS AND SUGGESTIONS

Members, directors, and managers of cooperative cotton gins in Oklahoma face a serious problem of high ginning costs, which are likely to increase further under the present method. In view of the present situation and outlook, and on the basis of findings in this study, the following recommendations and suggestions on ginning are presented.

Three alternative ways of reducing ginning costs are included in these recommendations and suggestions. The order of their listing is from the simple to the more complex and from the most limited to the broadest and most promising. However, two or all of these alternatives could be applied now without conflicting.

Directors and managers can improve the management of several cooperative gins by improving cost control. This suggestion applies to some gins with adequate volumes as well as some with smaller volumes. Opportunities for such improvement is reflected in $5 to $10 higher costs at some gins than for others of about the same capacity and with about equal volumes. These higher costs are caused by excessively high labor costs or a combination of higher costs on several items. High depreciation is a major cause of high costs of some gins. It is almost impossible to change depreciation, once investments are made, but other gins can plan to avoid this danger. This approach applies primarily to gins with costs considerably higher than for similar gins with similar volumes.

The second recommendation is that directors, members, and managers consider consolidating cooperative gins that have small and inadequate average volumes. Adequate volumes vary with specific capacities of gins. Some gins now have adequate volumes, and so this approach does not apply to them. This study indicated a general measure of adequate average volumes was over 2,000 bales for low-capacity gins and over 4,000 for high-capacity gins. Unless the management is above average, costs are likely to equal the charges for ginning and the margin on cottonseed on volumes up to 2,000 bales at low-capacity gins and on up to about 4,000 bales at high-capacity gins. Consequently, little or no cash is available as refunds from these sources to reduce ginning costs to members.

It is suggested that Oklahoma cotton growers explore the possibility of consolidating cooperative gins with inadequate volumes by selling the assets of many of the gins and taking the cotton to the remaining cooperative gins. This process would continue until the remaining gins had adequate volumes. With average or better management, the gins should then be able to return cash refunds to growers because of the lower costs of ginning the larger volumes.

Sales of gin assets and distribution of the proceeds according to equities and bylaws avoid many problems connected with mergers and other types of consolidations. Nearly all Oklahoma cooperative gins have excess gin capacity and would welcome the extra cotton from the dismantled gin.

Consolidation of cooperative gins does away with the convenience of a nearby gin to some growers, but it should reduce ginning costs enough to make hauling cotton somewhat further worthwhile. The capacity of the remaining cooperative gins should be adequate for unloading trailers in less than 24 hours. Many growers and custom harvester operators have enough trailers to hold the cotton harvested in a day and can operate continuously when trailers are unloaded within about 24 hours.

Directors and managers can compare cost of their gin operations with cost compilations prepared by the Wichita Bank for Cooperatives each year. Other information that can be used by members and management include comparisons of payment of earnings previously retained by gins, amounts of current cash refunds, and costs and revenues at other cooperative gins. The condition of cooperative gins' machinery concerns growers but economically only to the extent that it pays to maintain or replace it.

Good management is needed for all gins but especially for cooperative gins receiving cotton from growers who sold a co-op gin with inadequate volumes. Unless such gins are well managed, the growers may receive little if any benefit from consolidation. That would discourage further consolidations which are badly needed to provide opportunities for reducing ginning costs of conventional gins.

The third and potentially by far the most rewarding approach is for Oklahoma cotton growers who are members of cooperative gins,

their boards of directors, and managers to consider organizing a cooperative central ginning association. This approach would have potential application to all cooperative gins in Oklahoma and to those nearby in Texas.

The purpose of the central ginning association initially would be to finance and supervise the testing of the potentialities of central ginning and then to operate a central gin or gins, if the testing proves central ginning is practical in improving cotton spinning quality and lowering ginning costs substantially.

It is suggested that members of cooperative gins in Collingsworth, Hardeman, Hall, Wilbarger, and other Texas counties near the southwestern part of Oklahoma be invited to join the central ginning association, since they are located where their cotton could be handled economically with that in southwest Oklahoma.

This study and two previous studies (4) and (6) indicated central ginning could substantially reduce ginning costs. However, it is recognized that many growers are not familiar with this method. Consequently, explanations and demonstrations will be needed to establish confidence in it and for applying it. A pilot plant could be used to demonstrate its practicality. Testing would include these and other aspects of testing and application of this method.

LITERATURE CITED

(1) Campbell, John D.
1961. Effects of electric rates on power expenses of cotton gins. U.S. Dept. Agr., FCS, MRR No. 470

(2) ________
1962. Power expenses of cotton gins by types of power, Arkansas, Oklahoma, and Texas. U.S. Dept. Agr., FCS, MRR No. 520

(3) ________
1964. Costs of ginning cotton by cooperatives at single-gin and two-gin plants. California, 1962. U.S. Dept. Agr., FCS, MRR No. 640

(4) ________
1964. Economics of baling and storing seed cotton for processing at a central gin. U.S. Dept. Agr., FCS, Serv. Rpt. No. 67

(5) ________
1965. Costs of using basket-storage systems, California and Texas, 1964. U.S. Dept. Agr., FCS, MRR No. 736

(6) ________
1969. Central cotton ginning: comparative costs, use in other countries, and potential use in the United States. U.S. Dept. Agr., FCS, Res. Rpt. No. 4

APPENDIX

Section I. Gin Capacities Used in This Report

Gin capacities were an important factor in this study for several reasons. During interviews, some managers and directors indicated that the installation of higher capacity gin equipment is or may be one way to reduce ginning costs, especially labor costs. Several gins had installed higher capacity equipment and several had not. Consequently information collected on costs and capacity could be used to check that viewpoint.

Capacity of gins also determines the number of bales a gin can process during a season. The number of bales a gin can handle satisfactorily during a season would influence consolidations and other types of organization.

Managers and directors of the Oklahoma cooperative gins were asked how many bales their gins could average per 24-hour day when operating at capacity. The information they supplied and other sources of information on gin capacities were combined to develop the estimated average capacities of various gin stands used in Oklahoma (table 9).

The capacities of all the co-op gins were determined for this study by multiplying the capacities of their stands by the rates shown in table 9. For example, a gin with four 90-saw stands with 12-inch saws would be estimated to have a capacity of 5.2 bales per hour, while a gin with four 88-saw stands with 12-inch saws, would have a capacity of 10.0 bales per hour.

The capacities shown in table 9 are approximately the same as the averages reported in the survey. Capacities shown in table 9 differ from those quoted by manufacturers and may differ from the capacities realized in other areas in actual operations. These capacities include time for maintenance and changing from trailers of different growers and are estimated to correspond to actual rates realized in Oklahoma. Those capacities appear consistent. They provide a basis for developing comparable capacities for gins with different kinds and sizes of gin stands.

Table 9.--Estimated average capacities of gin stands in Oklahoma, 1967

Gin stands: No. of saws	Gin stands: Diameter of saws	Estimated capacity per hour per stand
	Inches	Bales
80	12	1.0
90	12	1.3
88	12	2.5
100	12	1.5
120	12	2.5
177	11 3/4 and 12	4.0
75	14	2.0
75	16	2.2
79	16	2.3
119	16	3.6
140	16	4.0
80	18	3.0
120	18	4.0

The gin managers interviewed were also asked how many bales their gins could handle satisfactorily in a season with present machine-harvesting methods.

The amount of cotton a gin can process in a 21-day peak period largely decides the maximum volume of cotton it can handle satisfactorily. It was found in this study and in a previous California and Texas study (3) that about 65 percent of the cotton is commonly harvested in the 21-day peak. It was also found that gin receipts varied considerably during the 21 days and consequently, the average 65 percent of the crop ginned in the 21-day peak is less than 21 times the daily capacity. Further

analysis and calculations showed that the maximum satisfactory capacity as reported by the Oklahoma gin managers was approximately equal to 75 to 80 percent of the daily gin capacity times 21 days. A specific example may help clarify these relationships.

Assume a gin has a 10-bale-per-hour capacity, including time for maintenance. Such a gin would have a capacity of 240 bales for each 24 hours. Such a gin would have a theoretical capacity in 21 peak days of 21 x 240 or 5,040 bales. But the expected maximum that is likely to be realized because of irregular deliveries on some of the 21 days equals 80 percent of 5,040 bales, or 0.80 x 5,040 = 4,032 bales. Then if 4,032 bales = 65 percent of the maximum satisfactory seasonal volume, the seasonal volume would be 4,032 ÷ 0.65 x 100 or 6,203 bales.

On the basis of these relationships the following formula was developed for estimating the maximum satisfactory gin capacity in bales for a season:

Satisfactory seasonal capacity = 21 peak days x gin capacity in 24 hours x 80 percent ÷ 65 percent = bale capacity for the season.

This formula provides fairly accurate approximation of gin capacities for a season with machine harvesting. It is a means of establishing a similar or common base for gins of different sizes and permits making more accurate comparisons. Gin crews, gin managers, condition of cotton, the time when the cotton is delivered, and other factors influence the ginning rates and volumes in actual operations.

This procedure gives results that compare closely with the average estimates given by gin managers. The gin managers' estimates of maximum satisfactory capacities for 50 gins averaged 4,466 bales. The averages of the capacities calculated for the same 50 gins by the procedure described above averaged 4,606 bales, or 140 bales more per gin for the season and a difference of about 3 percent.

Section II. Cost Adjustments, Related Procedures, and Hauling Cost Data

Some of the procedures followed on costs used in table 8 and elsewhere in this report are discussed in further detail in this section.

The weighted costs per bale of $29.18 for the 54 cooperative gins as shown in table 8 were determined by adding the costs of all 54 gins and dividing that total by the 111,885 bales they ginned in 1967. The items making up that total were calculated in a similar way. Costs not included in the nine common items were combined in "other". Social security payments by gins, workmen's compensation, and unemployment insurance were transferred to salaries and operating labor before combining the remaining costs into "other." Repair labor was included in gin supplies and repairs rather than operating labor. Social security, workmen's compensation, and unemployment insurance were not calculated on repair labor, since many gins combined repair labor with repair parts and materials in their accounts.

The costs of the 10 single-plant cooperatives with 3,000- to 5,600-bale volumes were treated in the same way as the costs of the 54 cooperatives and the resulting averages were called "estimated costs for consolidated gins."

The costs for central gins shown in table 8 were developed by adjusting costs developed in previous reports for the Lubbock area of Texas (4 and 6). The adjustments were mostly increases that were thought to be needed because of rising price levels.

A manager's salary of $18,000 or 50 cents a bale was considered adequate for a central gin that processed 36,000 bales. Fifty cents per bale may be more than required for managers' salaries of central gins handling over 36,000 bales.

Office salaries were only 10 cents more per bale in table 8 for the 54 gins than for the consolidated gins. This small difference apparently existed because the managers of several gins

with small volumes also handled the office work. Central gins would likely use office machines and possibly computers, and could likely reduce the cost of office work substantially.

The 54 gins averaged 3 man-hours per bale, including time spent waiting for cotton to arrive. The consolidated gins were somewhat more efficient and used only about 2.6 man-hours per bale. The $1.75 per bale shown in table 8 for both central gins equals the average wage rate per hour for the gins in the survey and was referred to as 1 man-hour in the report. Technically the wage rate in central gins would likely be more than $1.75 per hour. But in view of the increase in rates of ginning resulting from ginning continuously, $1.75 per bale appears a reasonable estimate for cost of the labor required per bale.

The consolidated gins had a small advantage on utility costs (table 8), because of lower rates on larger amounts, especially electric power. Central gins would have a much greater advantage, since they would likely qualify for electric power rates of about 1.0 to 1.4 cents per kilowatt-hour compared with 2 to over 3 cents paid by most conventional gins. Central gins could probably qualify for rates similar to those cottonseed oil mills pay.

The additional cost of hauling for consolidated gins was included to cover the cost to growers of hauling one-third of 4,100 bales--1,367 bales--an average of 12 miles further. It was assumed that gins in adjacent areas would consolidate and growers originally in the territory of the remaining gin would haul their cotton the same distance, while those in some parts of territories of discontinued gins would haul theirs little if any further. A hauling cost of $1.20 a bale on the 1,367 bales was calculated on the basis of 10 cents a mile each way for two bales on a trailer. That amounted to $1,640.40 extra on the 4,100 bales. Basic hauling costs are shown in table 10.

The original investments in gin building and machinery for the 54 gins averaged $200,000 each. For the consolidated gins, original investments averaged $260,000 each. The central

Table 10.--Averages of estimates by directors and gin managers on items related to cost of hauling seed cotton to Oklahoma cooperative gins, 1967 crop

Item	Unit	Directors' estimates		Gin managers' estimates	
		Number reporting	Average of estimates	Number reporting	Average of estimates
Speed traveled to and from gin when hauling seed cotton....................	Miles per hour	42	28.5	43	29.8
Gasoline..............................	Miles per gallon	38	8.7	41	9.5
Oil used for change and added between changes...............................	Quarts	41	6.7	--	--
Cost of oil...........................	Cents per quart	43	33.8	--	--
Oil change............................	Miles	43	2,550	--	--
Cost of oil filters	Dollars	37	2.25	--	--
Filter change.........................	Miles	41	2,790	--	--
Cost per tire for pickups.............	Dollars	43	25.50	--	--
Tires, each..........................	Mileage	44	21,000	--	--

gin with receiving stations and sample gin had an estimated original investment of $812,500. The central gin without receiving stations, but with a sample gin, had an estimated original investment of $362,500.

Based on half of those original investments, the average investment per bale of the 54 gins on average volumes of 2,072 bales was $48.26 ($200,000 ÷ 2 = $100,000, and $100,000 ÷ 2,072 bales = $48.26 per bale). Similarly, the average investments per bale were $31.71 per bale for consolidated gins; $11.28 per bale for central gin with receiving stations and a sample gin; and $5.03 per bale for central gin without receiving stations but with a sample gin. Interest on investment was calculated at a rate of 6 percent on these amounts.

Central gins would have substantially fewer repair costs because their labor would be more skilled, they could buy repairs and supplies in larger lots, and replace fewer parts that are only partially worn out during annual repair periods. Also, they would be under less pressure to gin at maximum rates in peak periods.

Bagging and tie costs were estimated slightly lower for central gins because of larger volumes, less handling, and less hauling of small lots.

Depreciation costs per bale differed widely among the gins shown in table 8. The rates used by the 54 gins averaged slightly less than 7 percent and slightly over 7 percent for the consolidated gins. The rate used for both central gins was 7 percent. Consequently the depreciation shown resulted primarily from the investments in buildings and machinery and the volumes ginned. The depreciation on the sample gin used in the central ginning system was included in the ginning portion of sample analyses costs rather than in ginning costs. Differences in depreciation account for an important part of the differences in total costs.

Property taxes and insurance on property on a per bale basis also varied largely with volumes ginned and consequently were comparatively low for central gins.

The receiving station costs used in a previous report, (6) totaled $3.33 per bale, which included 32 cents for interest on investment. The interest charges were included as the last item in table 8 and were therefore omitted from receiving station costs. The remaining receiving station costs were increased about $1 or to a total of $4 per bale to cover increases in cost of labor, wire for baling, and other items.

Section III. Equations Used for Charts

Equations Used to Fit Curves to Figures 2 And 3

The equations used to derive the curves fitted in figures 2 and 3 are as follows:

All gins $\log \hat{Y} = 2.63859 - 0.3495 \log X$

High-capacity gins $\log \hat{Y} = 2.95357 - 0.4357 \log X$

Low-capacity gins $\log \hat{Y} = 2.84386 - 0.4285 \log X$

where $\hat{Y}$ = estimated costs per bale ginned

X = number of bales ginned.

The simple correlation coefficient, r, for each group of cost and volume data, is:

	All gins	High-capacity gins	Low-capacity gins
r =	0.79	0.79	0.81.

Other FCS Publications Available

Central Cotton Ginning - Comparative Costs, Use in Other Countries, and Potential Use in the United States. Research Report 4, 1968. 46 pp.

Economics of Delinting Cottonseed to Low Residual Linters at Oil Mills. By Elmer J. Perdue and S. P. Clark. Marketing Research Report 720, 1965. 14 pp.

Costs of Ginning Cotton by Cooperatives at Single-Gin and Two-Gin Plants, California and Texas, 1962. By John D. Campbell. Marketing Research Report 640, 1964. 31 pp.

Power Expenses of Cotton Gins - by Types of Power - Arkansas, Oklahoma, Texas. By John D. Campbell. Marketing Research Report 520, 1962. 47 pp.

Cotton Cooperatives on the Plains of Texas: Services and Benefits. By Henry Bradford. Circular 33, 1966. 54 pp.

Crushing Cottonseed Cooperatively. By Elmer J. Perdue. Circular 30, 1962. 23 pp.

SWIG - Southwestern Irrigated Cotton Growers Association, El Paso, Texas. By Otis T. Weaver, Circular 29, 1962. 65 pp.

Oklahoma Cotton Cooperatives. By John D. Campbell. General Report 108, 1963. 11 pp.

A copy of each of these publications may be obtained while a supply is available from--

Farmer Cooperative Service
U.S. Department of Agriculture
Washington, D.C. 20250

☆ U. S. GOVERNMENT PRINTING OFFICE : 1970—394-378/FCS-44